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GREAT LAKES FORESTRY CENTRE
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A review of important forest insect and disease problems in the TERRACE BAY DISTRICT of Ontario, 1950 - 1980

Compiled by

M. J. Thomson, H. J. Evans, D.C. Constable, C. G. Jones and L. S MacLeod

Miscellaneous Report No. 47

Canada

87-04664/

THE GREAT LAKES FORESTRY CENTRE

The Great Lakes Forestry Centre is one of six regional establishments located across Canada and operated by the Canadian Forestry Service. The overall objective of the Service is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. The Centre pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

Forestry problems are continually assessed by the Canada-Ontario Joint Forestry Research Committee, made up chiefly of senior members of the Centre and the Ontario Ministry of Natural Resources. The Committee ensures that the research resources of both agencies are effectively transmitted to the forest managers in order to improve forest production and protection, and the quality of the environment.

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The Centre recognizes that forested land must be managed in the best public interest, not only for the wood production essential to our economy but also for the recreational purposes that are so important to our social well-being. These goals must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

A REVIEW OF IMPORTANT FOREST INSECT AND DISEASE PROBLEMS IN THE TERRACE BAY DISTRICT OF ONTARIO, 1950-1980

Compiled by

M.J. Thomson, H.J. Evans, D.C. Constable, C.G. Jones and L.S. MacLeod[1]

GREAT LAKES FORESTRY CENTRE

CANADIAN FORESTRY SERVICE

GOVERNMENT OF CANADA

1986

MISCELLANEOUS REPORT NO. 47

[1] *Forest Research Technicians, Forest Insect and Disease Survey Unit*

©Minister of Supply and Services Canada 1986
Catalogue No. Fo29-8/47E
ISBN 0-662-15057-0
ISSN 0832-7130

Additional copies of this publication are available at no charge from:

Communications Services
Great Lakes Forestry Centre
Canadian Forestry Service
Government of Canada
P.O. Box 490
Sault Ste. Marie, Ontario
P6A 5M7

FOREWORD

The first forest insect surveys in Ontario were carried out in 1936 from the Dominion Entomological Laboratory in Ottawa and continued from this location until 1944, when the province of Ontario was divided, for the purpose of these surveys, into northern and southern Ontario. In 1945, personnel from Ottawa continued to conduct and report on surveys in the area south of the Algonquin Park and Parry Sound forest districts, while personnel from the Forest Insect Laboratory in Sault Ste. Marie carried out surveys in the area to the north. In 1950 responsibility for reporting insects for all of Ontario fell to the Sault Ste. Marie laboratory. In 1952 the Forest Disease Survey was initiated with headquarters in Maple, Ontario, then was moved to Sault Ste. Marie in 1967. The results of these surveys of insects and diseases are reported in the Annual Report of the Forest Insect and Disease Survey (FIDS) published by Canadian Forestry Service headquarters in Ottawa. In addition, annual district and regional reports, begun in 1948, are prepared by FIDS technicians (Rangers) in Sault Ste. Marie. In 1980 a new provincial report was released in Ontario. The contents of the following review have been abstracted from these reports and compiled in alphabetical order by the scientific names of species in each of the following categories:

Major Insects or Diseases

Capable of causing serious injury to or death of living trees or shrubs.

Minor Insects or Diseases

Capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs.

Abiotic Damage

Damage caused by non-living factors.

All measurements in this review are in metric form and conversions from Imperial measurements given in the earliest reports are taken to the second decimal point [i.e., sq. mi. to km^2 = area (sq. mi.) x 2.59 = area km^2]. Infestation maps in this review were copied from the original maps in the FIDS technicians' reports. Abbreviations for the common names of the host tree species, along with the scientific names, are shown in Appendices A and B. To facilitate the location of hosts, deciduous and coniferous species have been separated and listed alphabetically under the common names.

Appendix C is a series of maps for northwestern Ontario grouped alphabetically by insect species or disease pathogen and showing the location of infestations within a region or infestation boundaries that extend beyond regions.

ACKNOWLEDGMENTS

The authors wish to acknowledge Dr. G.M. Howse, Head, Forest Insect and Disease Survey; Miss C.A. Plexman, Chief, Communications Services; and Mr. P. Jakibchuk, Technical Services Officer, for advice and support during the preparation of this review.

We also wish to acknowledge the following authors of the annual FIDS district and regional reports from which this review was abstracted:

1950-1951	E.O. Clinton
1952-1955	K.C. Hall
1956-1960	W.M. Horricks
1961-1966	V. Jansons
1967	K.C. Hall, D. Constable
1968	K.C. Hall, C. Davis
1969	C. Davis
1970	H.R. Foster, J. Hook
1971	H.R. Foster, J. Hook
1972	H.R. Foster, J. Hook
1973	H.R. Foster, J. Hook
1974	H.R. Foster, M.J. Applejohn
1975	H.R. Foster, M.J. Applejohn
1976	H.R. Foster, H.D. Lawrence
1977	H.R. Foster, H.D. Lawrence
1978	H.D. Lawrence, W.D. Biggs
1979	H.D. Lawrence, W.D. Biggs
1980	H.D. Lawrence, W.D. Biggs

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INTRODUCTION

This is a review of significant forest insects and diseases that have occurred in the Terrace Bay District between 1950 and 1980. In 1973, the Terrace Bay District was formed from the southern part of the Geraldton District and the western part of the White River District. In the selection of pests for this report, particular attention was paid to the major working groups of host species in the District, mainly jack pine, white spruce, black spruce, balsam fir and the tolerant hardwoods (white birch and poplar) as well as some ornamental and shade trees. The insects and diseases included are capable of causing, or have caused, tree mortality or a reduction in growth. Also included are abiotic problems that caused damage, e.g., salt, frost, wind and snow damage, etc.

SUMMARY

FOREST INSECTS

Birch Skeletonizer, *Bucculatrix canadensisella* Cham. [Major]
pages 9-13

Defoliation by this insect seldom causes mortality of the host but weakened trees are subject to attack by secondary insects and diseases. Large outbreaks of this insect usually last 3 to 4 years, then decline rapidly. During 1963 and 1964, a small pocket of moderate-to-severe defoliation occurred in the Killala Lake area and collapsed in 1965. In the period 1970 to 1973 infestations were reported in the District but they declined in 1974.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.) [Major]
pages 14-16

No tree mortality was recorded as caused by this defoliator, which affects primarily aspen and poplar. Severe defoliation was recorded during the periods from 1956 to 1958 and again in 1972 to 1975.

Spruce Budworm, *Choristoneura fumiferana* (Clem.) [Major]
pages 17-37

This insect is considered the most destructive insect pest of several coniferous hosts in eastern Canada, the main hosts being white spruce and balsam fir. Though not major hosts, black spruce, eastern hemlock, and tamarack are attacked and considerable tree mortality can occur. During the period from 1952 to 1962, moderate-to-severe defoliation occurred in the District, but it declined in 1963. In 1975, small pockets of severe damage began to appear in Pic and Cotte twps and continued to expand throughout the District up to the end of the period covered by this report.

Larch Casebearer, *Coleophora laricella* Hbn. [Major]
page 38

A serious pest of both native and European larch, this insect can cause reduced tree growth and tree mortality after two successive years of complete defoliation. It was first recorded in the District in 1961, and low populations have occurred periodically over the past 19 years.

Forest Tent Caterpillar, *Malacosoma disstri* Hbn. [Major]
pages 39-41

This caterpillar is widely distributed through North America. Infestations usually last an average of five years and high populations denude large areas of susceptible stands. The principal host attacked is aspen; however, many other deciduous species also suffer severe defoliation. Repeated defoliation retards tree growth and reduces vigor, leaving the stands susceptible to attack by other pests. From 1950 to 1952 moderate-to-severe defoliation occurred in the southeastern part of the District and from 1953 to 1980 occasional light pockets of defoliation were reported.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.) [Major]
pages 42-43

Although this insect has not been known to cause tree mortality, severe browning of foliage over a period of years can cause a reduction in growth. Varying degrees of defoliation have occurred during the past 30 years.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.) [Major]
pages 43-44

This destructive insect has been categorized as a serious pest of young spruce plantations and open-growing ornamentals. High mortality can occur after successive years of severe defoliation. Varying degrees of defoliation have been recorded since 1950, especially on young open-grown trees in the District.

White Pine Weevil, *Pissodes strobi* (Peck) [Major]
page 44

This weevil is considered the most destructive pest of white pine in North America. Successive weeviling over a period of years results in multiple-stemmed trees. Low populations have occurred periodically since 1950.

Larch Sawfly, *Pristiphora erichsonii* (Htg.) [Major]
pages 45-46

The larch sawfly is the primary defoliating insect of native larch and most exotic species. On good sites, larch trees can withstand 6 to 9 years of severe defoliation before mortality occurs; on less favorable sites, mortality may follow 3 or more years of complete defoliation. During the past 30 years population levels of this insect have been present in high numbers at widely scattered points in the District.

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.) [Major]
pages 46-47

Although mountain-ash trees are not considered merchantable, a great many are utilized as shade and ornamental trees in urban and rural areas. The mountain-ash sawfly can weaken trees when prolonged severe defoliation occurs and subsequent borer infestations can cause mortality. High populations have been reported each year since 1973, except in 1979, when populations were low.

Ambermarked Birch Leafminer, *Profenusa thomsoni* (Konow) [Major]
page 47

This leaf miner is commonly found throughout most of the province, and is particularly abundant in the north. It has caused severe browning of birch foliage over large areas; however, serious injury to host trees seldom occurs. The first District record occurred in 1961, and from 1962 to 1964 high populations were reported. Since 1965, trace levels have occurred in the District.

Spearmarked Black Moth, *Rheumaptera hastata* (L.) [Major]
page 48

Infestations of this insect have been infrequent and tend to be of short duration, usually 1 to 2 years. Feeding causes browning of foliage and premature leaf drop. Moderate-to-severe defoliation occurred in 1963.

Other Noteworthy Insects [Major and Minor]
pages 49-58

Insects that have the potential for causing damage to stands, regeneration and plantations.

FOREST DISEASES

Armillaria Root Rot, *Armillaria mellea* (Vahl : Fr.) Kummer [Major]
page 61

This root rot disease often kills trees previously stressed by drought, insects, other pathogens or unfavorable environment. However, under some circumstances the fungus, or certain strains of the fungus, can kill vigorous trees. Both deciduous and coniferous trees are attacked. In 1976 and 1977, up to 10% mortality of black spruce and jack pine trees occurred in the District. However, during the past 30 years mortality averaged 2%.

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard
pages 61-65 [Major]

This destructive pathogen of young planted pine was first discovered in the District in 1966. The disease has caused tree mortality periodically at numerous locations.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary [Major]
and *C. ledicola* (Peck) Lagerh.
pages 66-67

These, the most widely spread rusts in the Canadian boreal forest, are a concern on mature trees, but the potential for damage in nurseries can be high as well. Varying degrees of foliar damage have been recorded in the District since 1954.

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver [Major]
pages 67-68

The ink spot disease is widespread throughout the range of aspen. Many poplar species and hybrids are susceptible, but trembling aspen is most commonly affected. Heavily infected trees may be defoliated prematurely and repeated attacks can reduce increment and even kill regeneration. Pockets of moderate-to-severe damage occurred in 1970, 1974 and 1979. Previous to 1970, light infections were reported in the District.

Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur and
Western Gall Rust, *Endocronartium harknessii*
(J.P. Moore) Y. Hirats. [Major]
page 68-69

These rusts may kill trees outright or make them more susceptible to insects, decay, and wind breakage, depending on the degree of infection. Various levels of infection have occurred periodically throughout the District since the diseases were first reported in 1963.

Shoot Blight, *Venturia macularis* (Fr.) Müller & v. Arx [Major]
page 69

Reduced stocking of regeneration aspen occurs when the incidence of this disease is high. Trees more than 5 years old are seldom affected and, therefore, the disease is of little economic importance in these stands. Moderate-to-severe shoot damage was reported in 1955, 1972, 1978 and again in 1979.

Other Noteworthy Diseases
page 70

These are diseases with the potential for causing damage to natural stands, regeneration and plantations.

ABIOTIC DAMAGE

pages 73-74

Abiotic damage is caused by a variety of influences, e.g., frost, winter drying, salt, etc. Weakened trees are susceptible to a number of diseases.

INSECTS

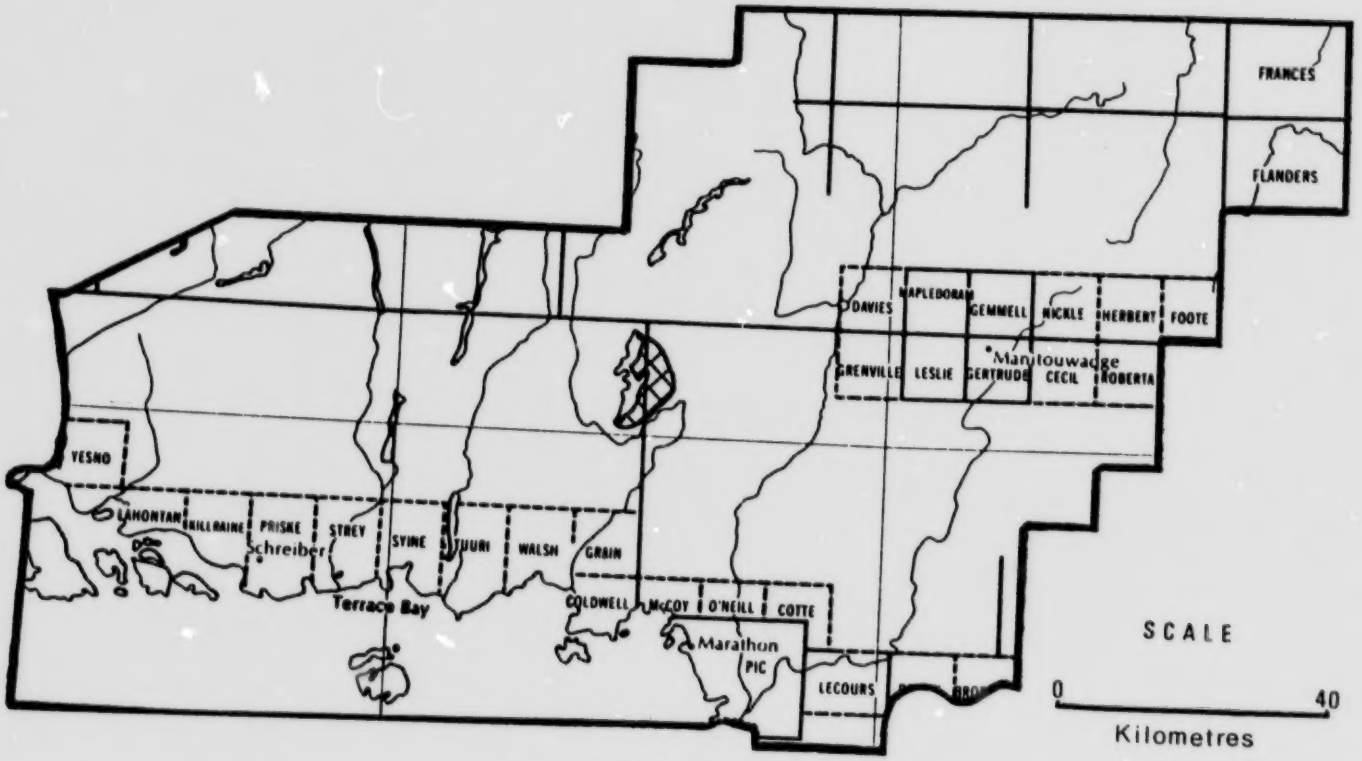
Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Host(s): birch

[Major]

Year	Remarks
1950-1962	not reported.
1963	A small pocket of moderate-to-severe defoliation approximately 2 ha in size occurred in the Killala Lake area.
1964	The infestation at Killala Lake increased in size to include stands along the entire eastern shore of the lake (see map, page 10).
1965	Population levels virtually collapsed in the Killala Lake area.
1966-1969	not reported
1970	small pockets of moderate-to-severe defoliation observed in the Hillsport area
1971	Moderate-to-severe defoliation occurred in the northeastern part of the District (see map, page 11).
1972	Moderate-to-severe defoliation occurred north of Terrace Bay and also in the Marathon area, extending eastward into the White River District. Light defoliation was evident throughout the remainder of the District (see map, page 12).
1973	Moderate-to-severe defoliation occurred in the western part of the District (see map, page 13).
1974	Population levels declined sharply in the District. Defoliation was less than 5%.
1975-1980	not reported

TERRACE BAY DISTRICT



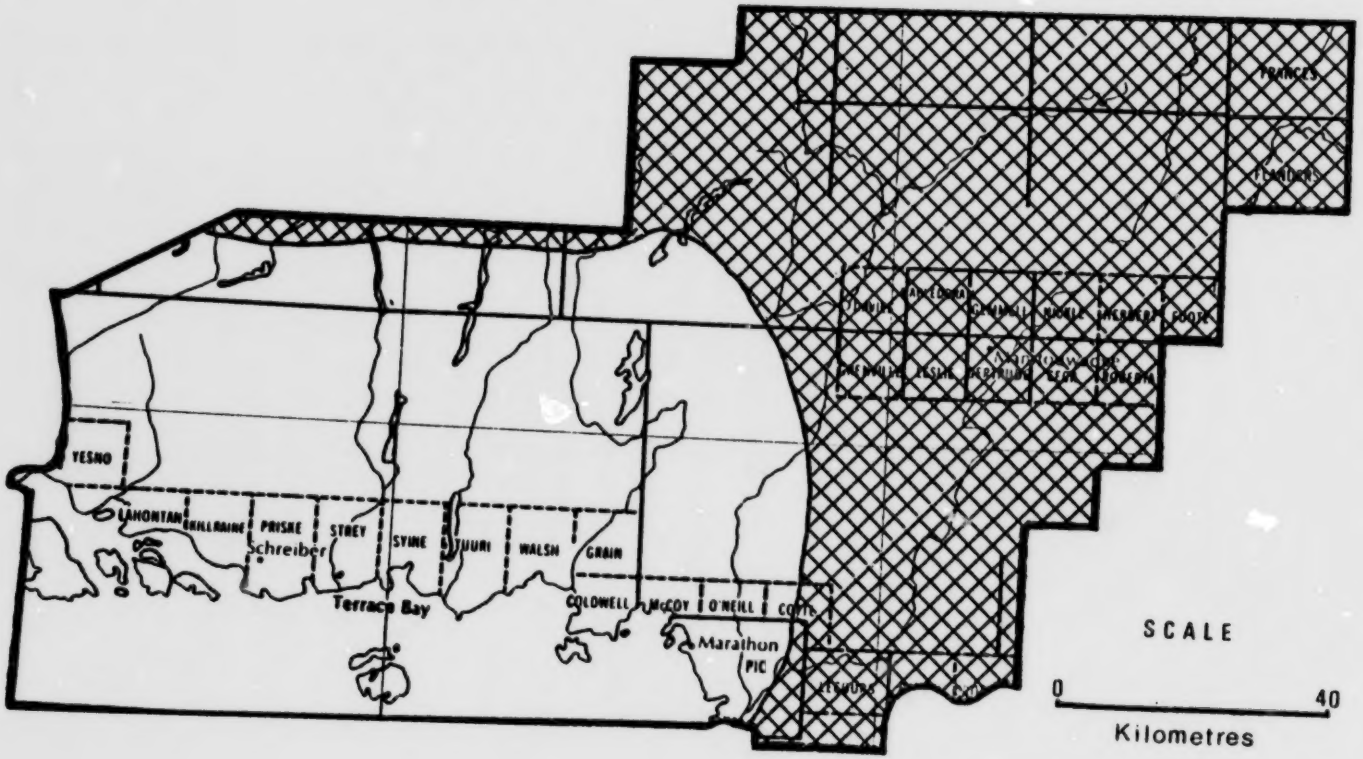
Birch Skeletonizer

Areas within which defoliation occurred in 1964

LEGEND

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



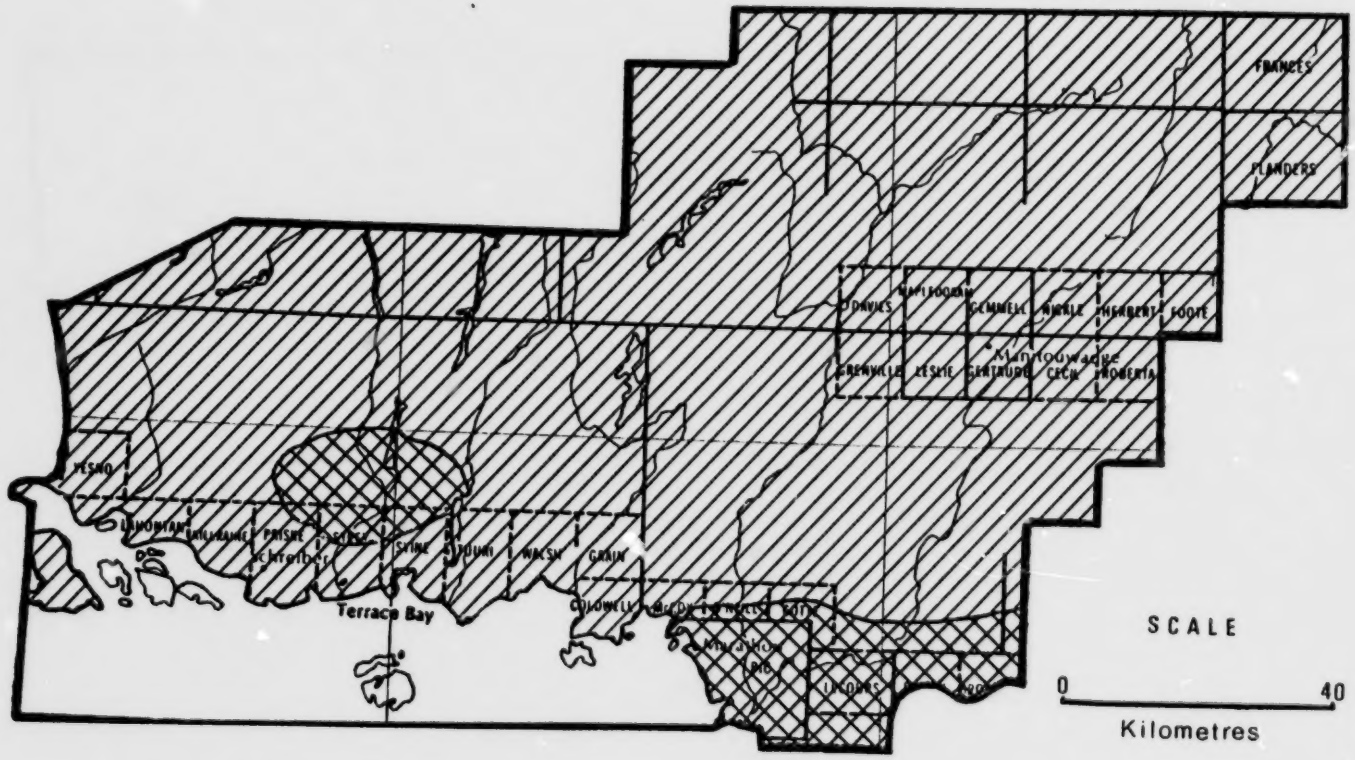
Birch Skeletonizer

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Birch Skeletonizer

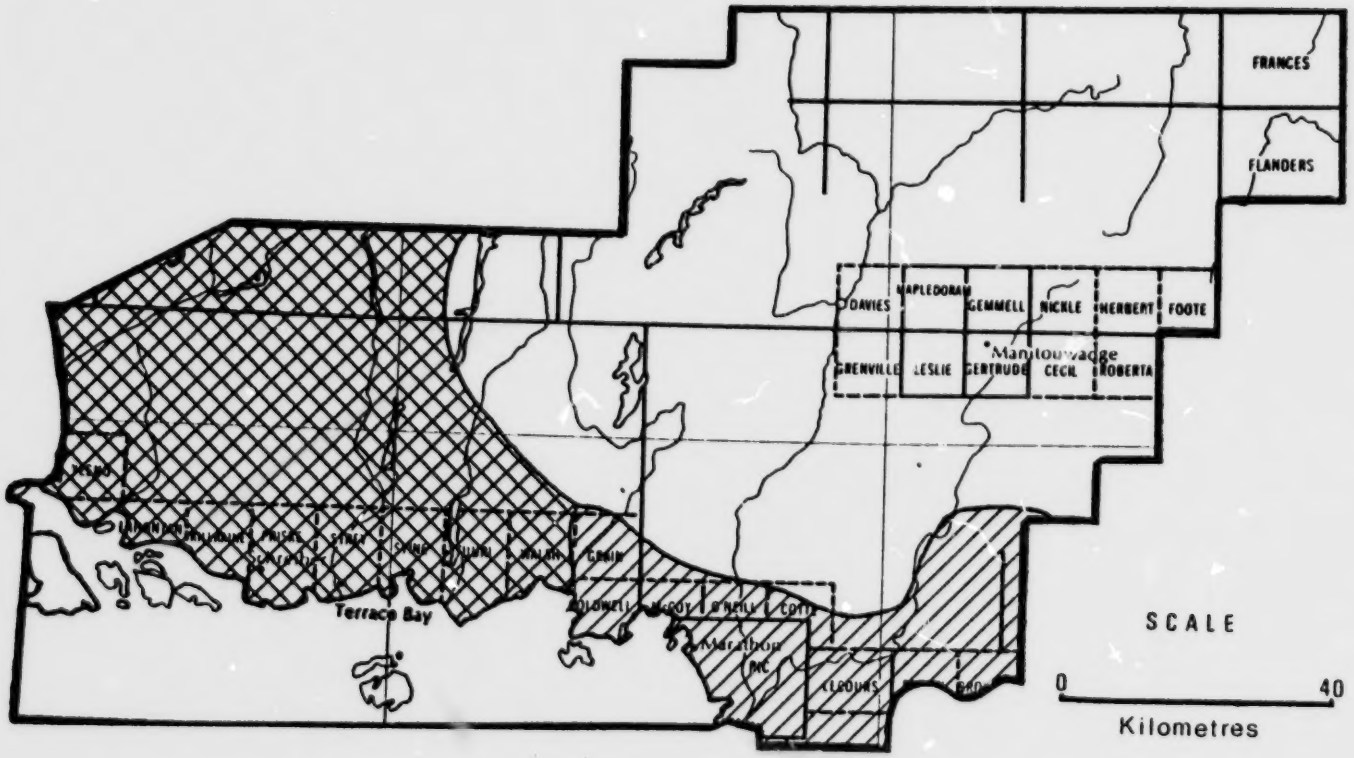
Areas within which defoliation occurred in 1972

LEGEND

Light defoliation

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Birch Skeletonizer

Areas within which defoliation occurred in 1973

LEGEND

Light defoliation

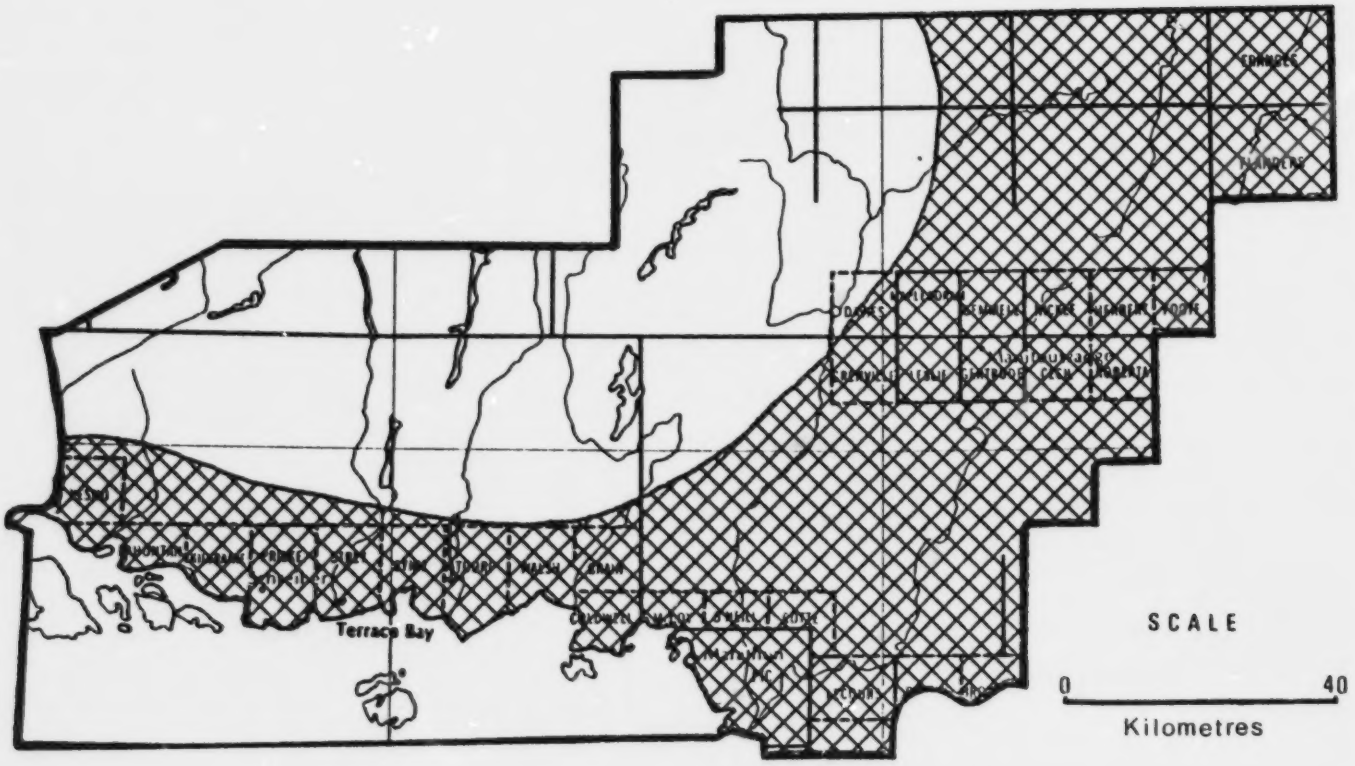
Moderate-to-severe defoliation

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)

Host(s): poplar [Major]

Year	Remarks
1950-1955	not reported
1956	Moderate-to-severe defoliation occurred south and west of Manitouwadge Lake.
1957	Moderate-to-severe defoliation continued in areas south and west of Manitouwadge Lake.
1958	Population levels declined sharply in the Manitouwadge Lake area.
1959-1971	not reported
1972	Moderate-to-severe defoliation occurred in a narrow band along the north shore of Lake Superior eastward to the White River District boundary and extended north to the Geraldton District boundary (see map, page 15).
1973	A slight decline in the total area of moderate-to-severe defoliation occurred in the District (see map, page 16).
1974	Population levels declined except for an area of moderate-to-severe defoliation at the south end of Long Lake.
1975	Moderate-to-severe defoliation continued south of Long Lake between the Steel and Auguasabon Rivers. The infestation covered approximately 1,036 km^2.
1976-1980	not reported

TERRACE BAY DISTRICT



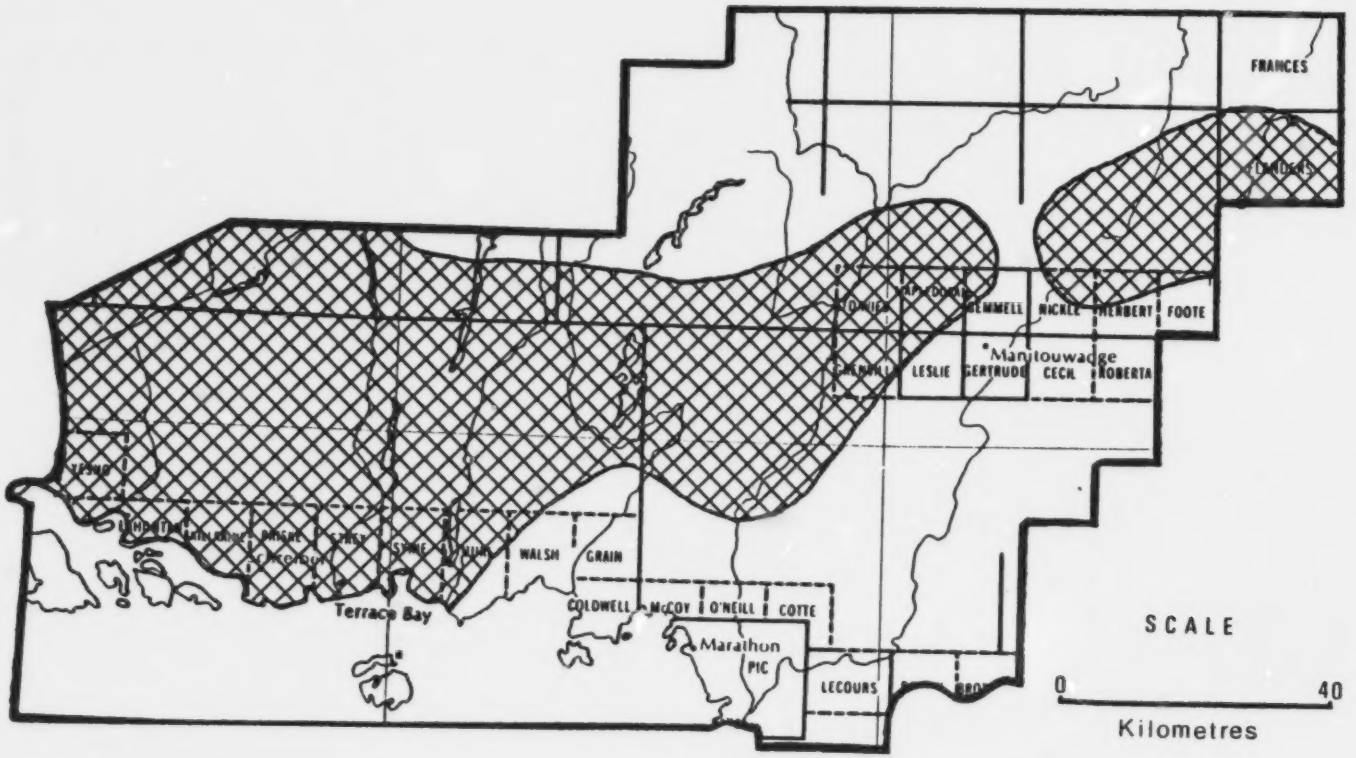
Large Aspen Tortrix

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Large Aspen Tortrix

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Host(s): bF, spruce

[Major]

Year	Remarks
1950	Population declines were evident throughout the District. Trace numbers of larvae were found in the Theresa Lake area. Moderate-to-severe mortality continued in the southeast corner of the District.
1951	not reported
1952	Light and moderate pockets of defoliation were reported in the Pays Plat area.
1953	Infestations increased in size. The infestation now covers an area from Lahontan Twp north to Pays Plat Lake and west to the Nipigon District boundary (see map, page 20).
1954	Infestations continued to increase in size. The largest area of defoliation covered approximately 258 km^2 (see map, page 21).
1955	The infestation extended eastward to the central part of Killraine Twp and north to Dickison Lake (see map, page 22).
1956	A further expansion occurred eastwards from Pays Plat to the Steel River (see map, page 23).
1957	Severe infestations continued in the District, with very little change in infestation boundaries (see map, page 24).
1958	A slight eastward and northward spread occurred in the Pays Plat area of the District (see map, page 25). Balsam fir mortality plots established in Wabasta and Cavers twps revealed 23% and 38% mortality, respectively.
1959	No major changes occurred in the infestation boundaries in the District (see map, page 26). Defoliation of host trees increased from 77% in 1958 to 82% in 1959. Balsam fir mortality in plots established at Wabasta and Cavers Lake increased to 36% and 52%, respectively. Mortality occurred in the western part of the District (see map, page 27).

(cont'd)

Spruce Budworm, *Choristoneura fumiferana* (Clem.) (cont'd)

Host(s): bF, spruce [Major]

Year	Remarks
1960	Population levels declined in the District (see map, page 28). This decline resulted in the reduction of the area of heavy infestation to approximately half that of 1959. Balsam fir mortality in plots at Wabasta and Cavers Lake increased to 37% and 73%, respectively (see map, page 29).
1961	There was little change in the area within which balsam fir mortality was present. The total area of heavy infestation declined and several changes in the boundaries of the infestations were also noted (see map, page 30).
1962	Population levels and areas of infestation declined sharply in the District. There was light damage between Chorus, Steel and Kagiano lakes where heavy infestations occurred in 1961 (see map, page 31). Balsam fir mortality at Pays Plat, Cavers and Wabasta lakes averaged 74%.
1963	In 1963, populations of the spruce budworm declined to endemic levels throughout the District. Mortality of balsam fir in the Pays Plat area was recorded at 79%.
1964	not reported
1965	Trace population levels were observed. Balsam fir mortality in the Pays Plat area is now ranging upwards to 91%.
1966-1968	not reported
1969	trace numbers of larvae found in the Rossport area
1970-1974	not reported
1975	small, isolated pockets of severe damage reported in Pic and Cotte twps (see map, page 32).
1976	Population levels continued to build up. Infestations were located along the Black River (north of Highway 17), near Heron Bay South, Neys Provincial Park and near the junction of highways 614 and 17. Defoliation totalled about 40,000 ha (see map, page 33).

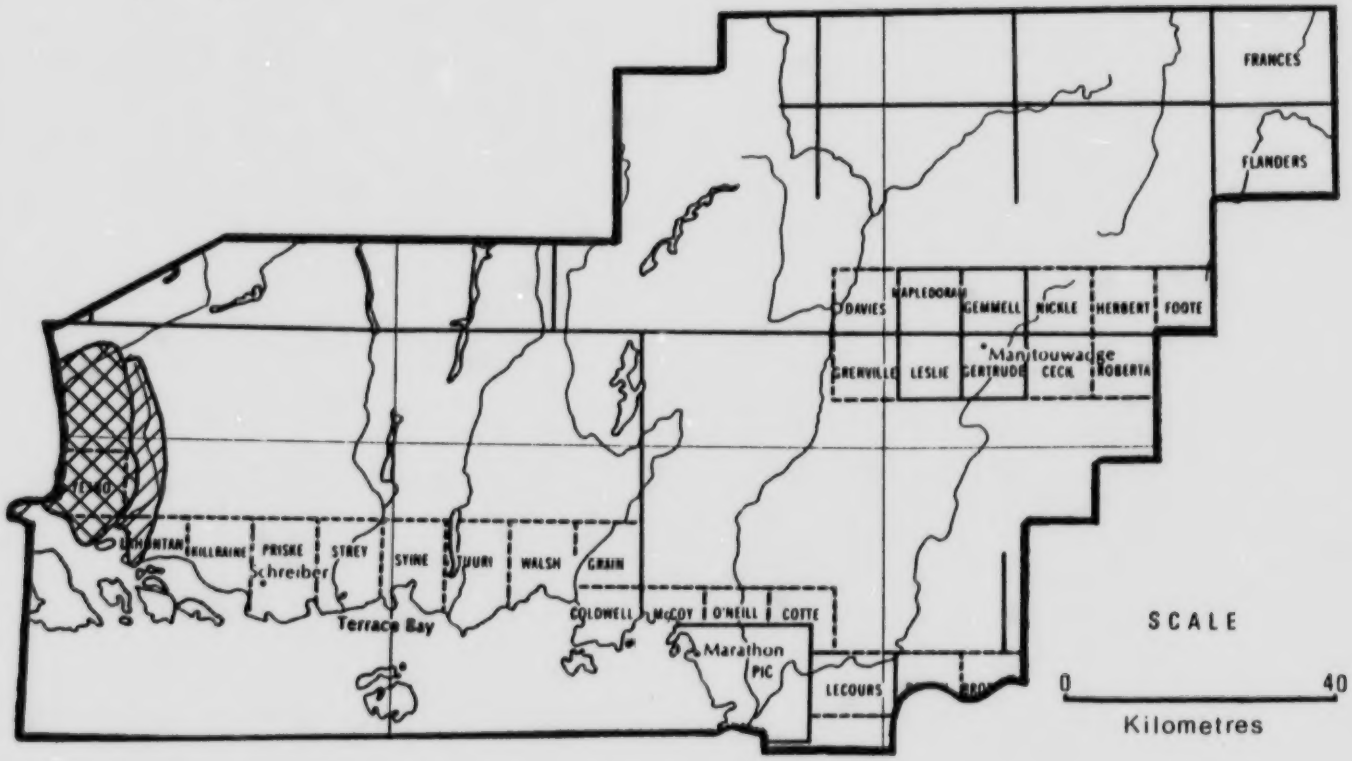
(cont'd)

Spruce Budworm, *Choristoneura fumiferana* (Clem.) (concl.)

Host(s): bF, spruce [Major]

Year	Remarks
1977	New infestations were found and some minor population declines were noted at several points in the southeastern part of the District (see map, page 34).
1978	Pockets of infestation north of the town of Manitouwadge increased in size (see map, page 35).
1979	High population levels continued in the District. Infestations were located near the town of Manitouwadge in Davies, Mapledoram and Gemmell twps and in the southeastern part of the District (see map, page 36).
1980	Moderate-to-severe defoliation occurred in the southeastern part of the District (see map, page 37).

TERRACE BAY DISTRICT



Spruce Budworm

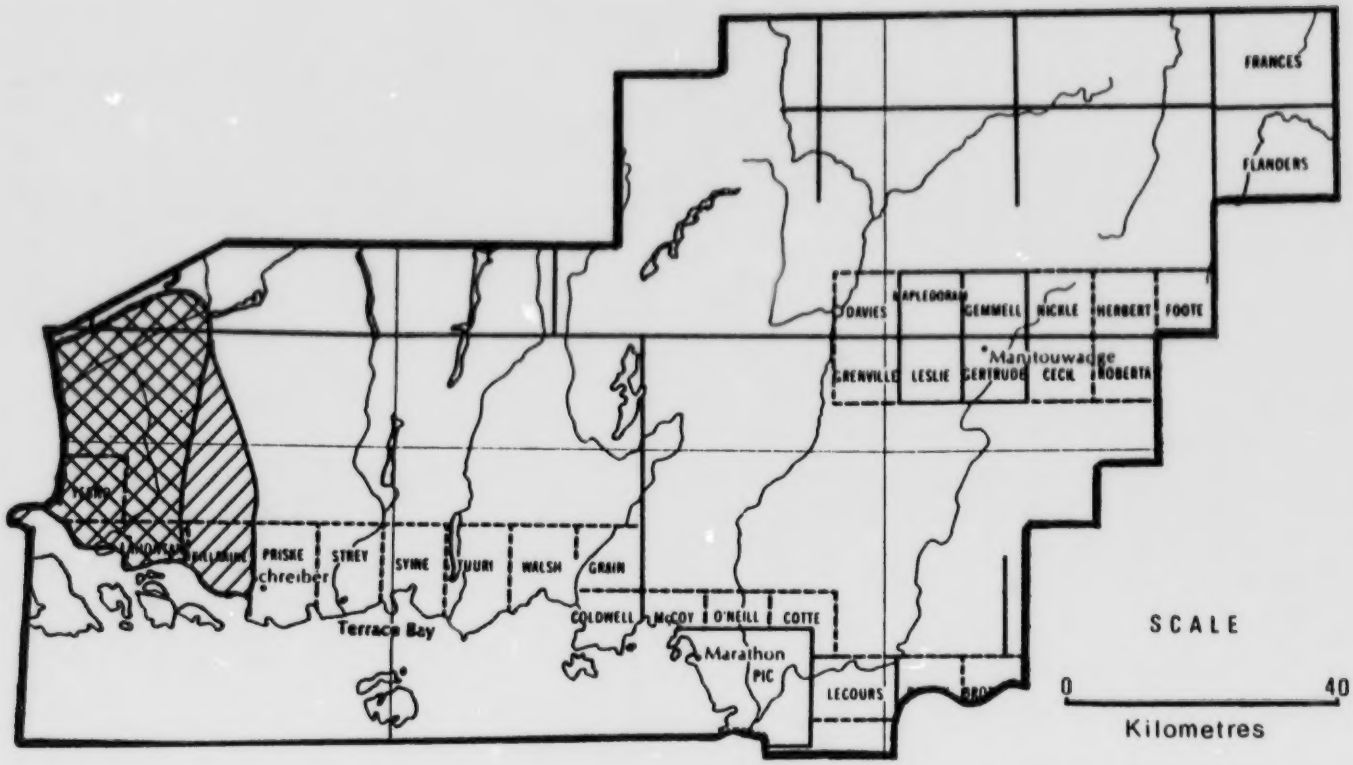
Areas within which defoliation occurred in 1953

LEGEND

Light defoliation

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Spruce Budworm

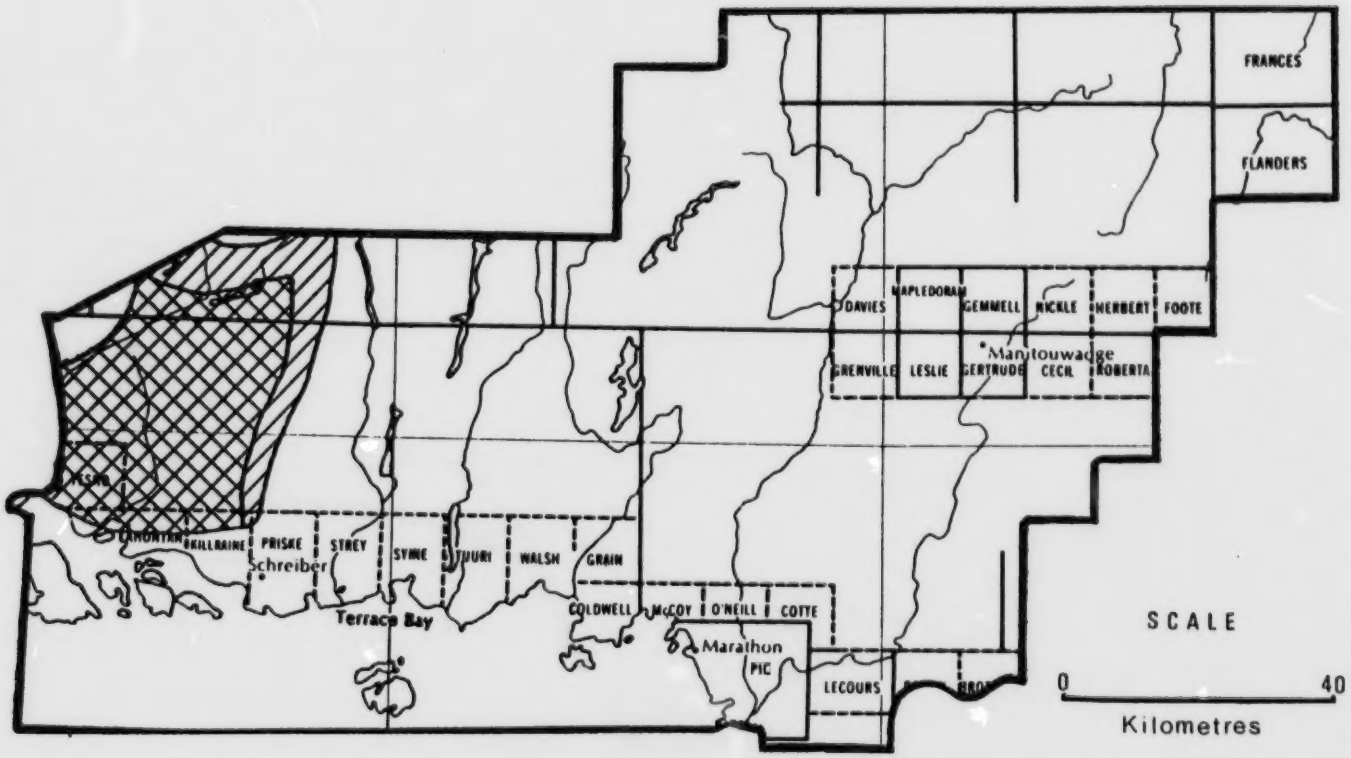
Areas within which defoliation occurred in 1954

LEGEND

Light defoliation

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Spruce Budworm

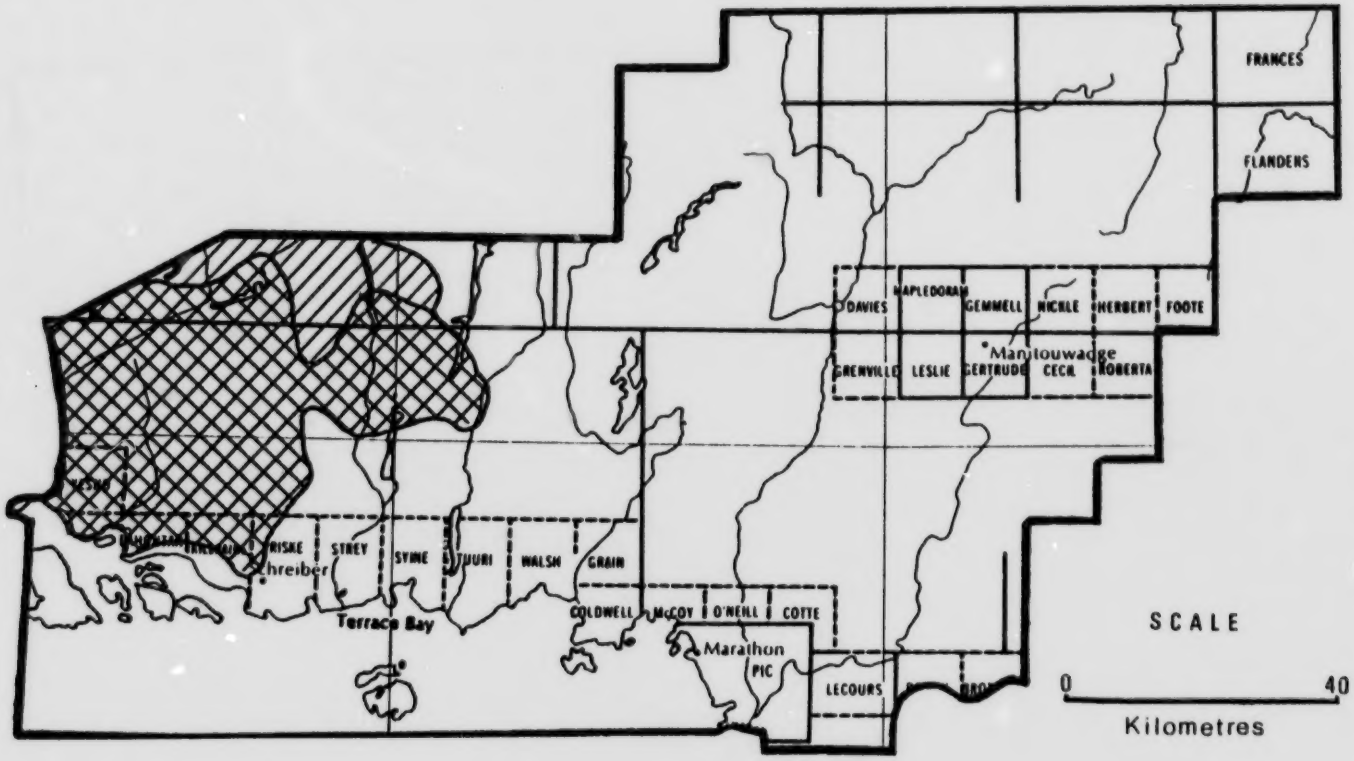
Areas within which defoliation occured in 1955

LEGEND

Light defoliation

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Spruce Budworm

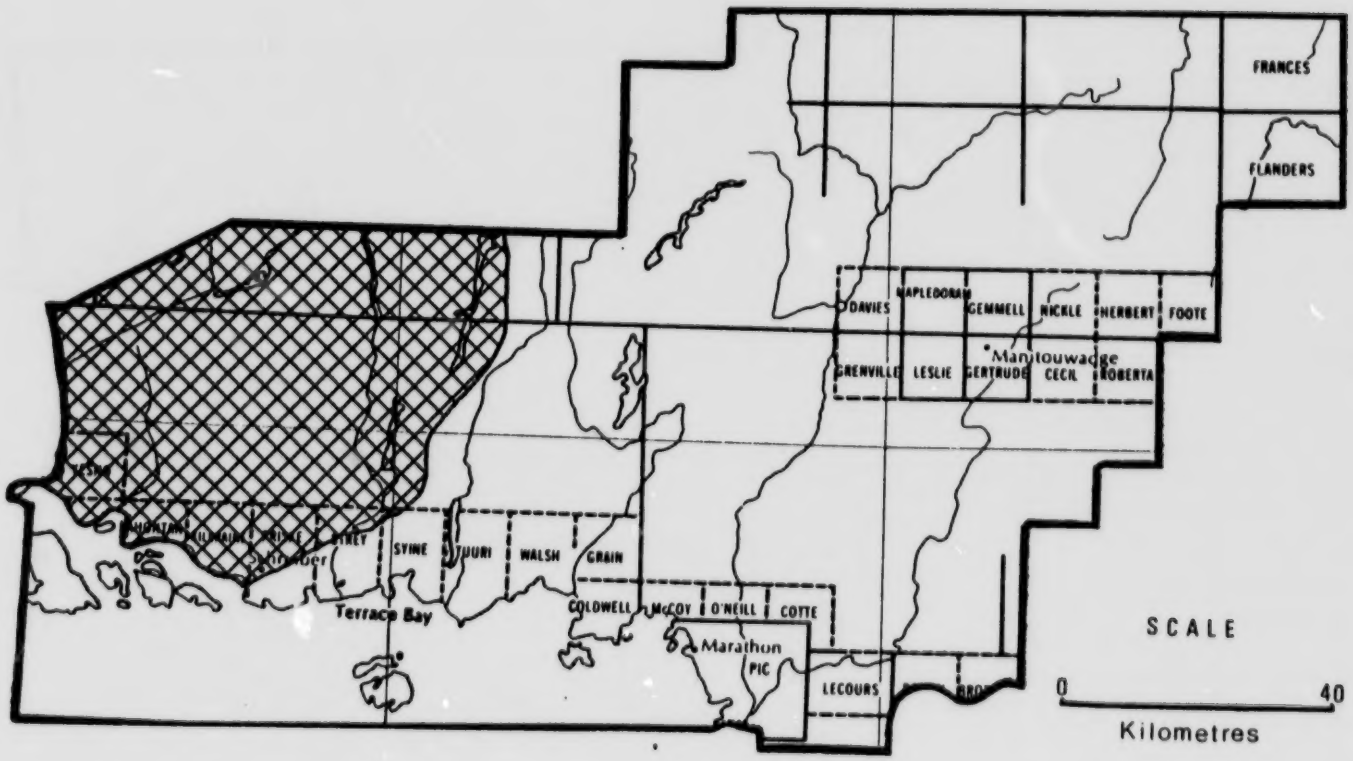
Areas within which defoliation occurred in 1956

LEGEND

Light defoliation

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



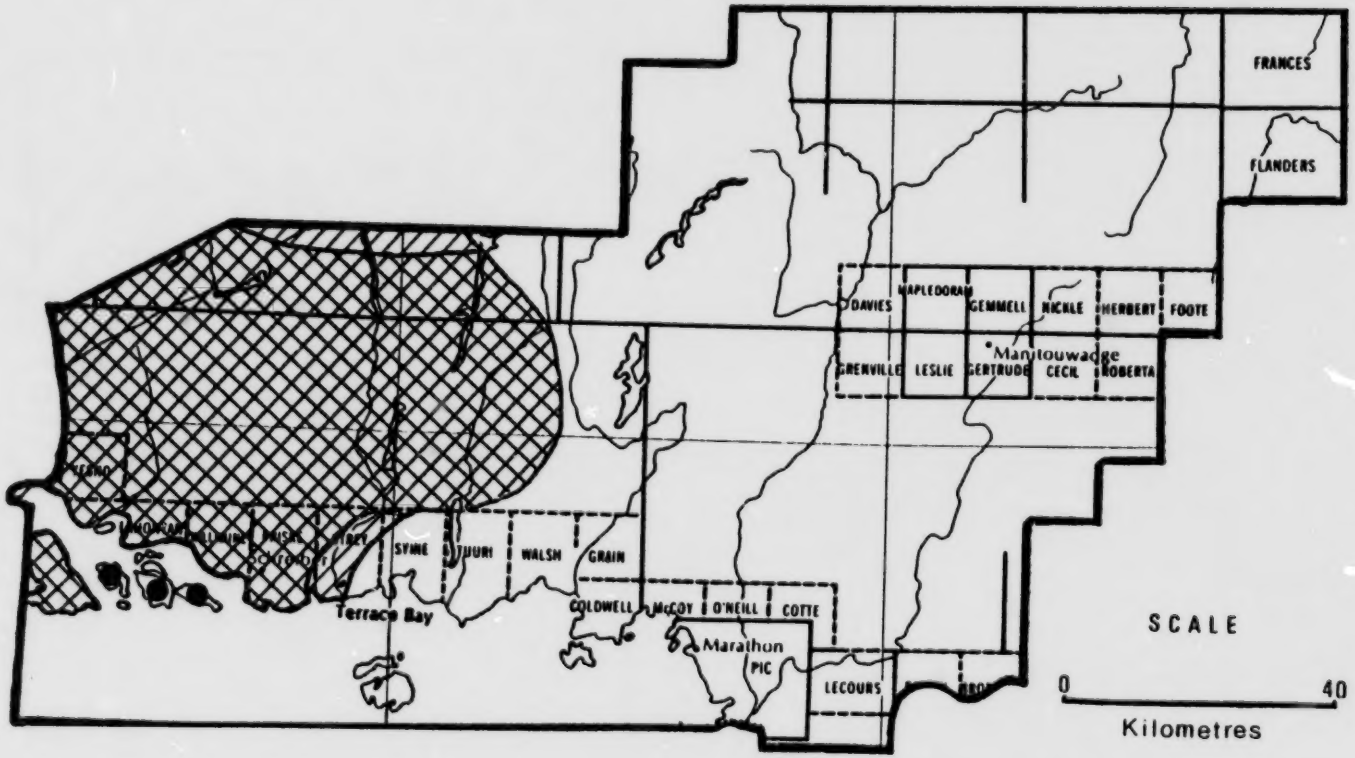
Spruce Budworm

Areas within which defoliation occurred in 1957

LEGEND

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Spruce Budworm

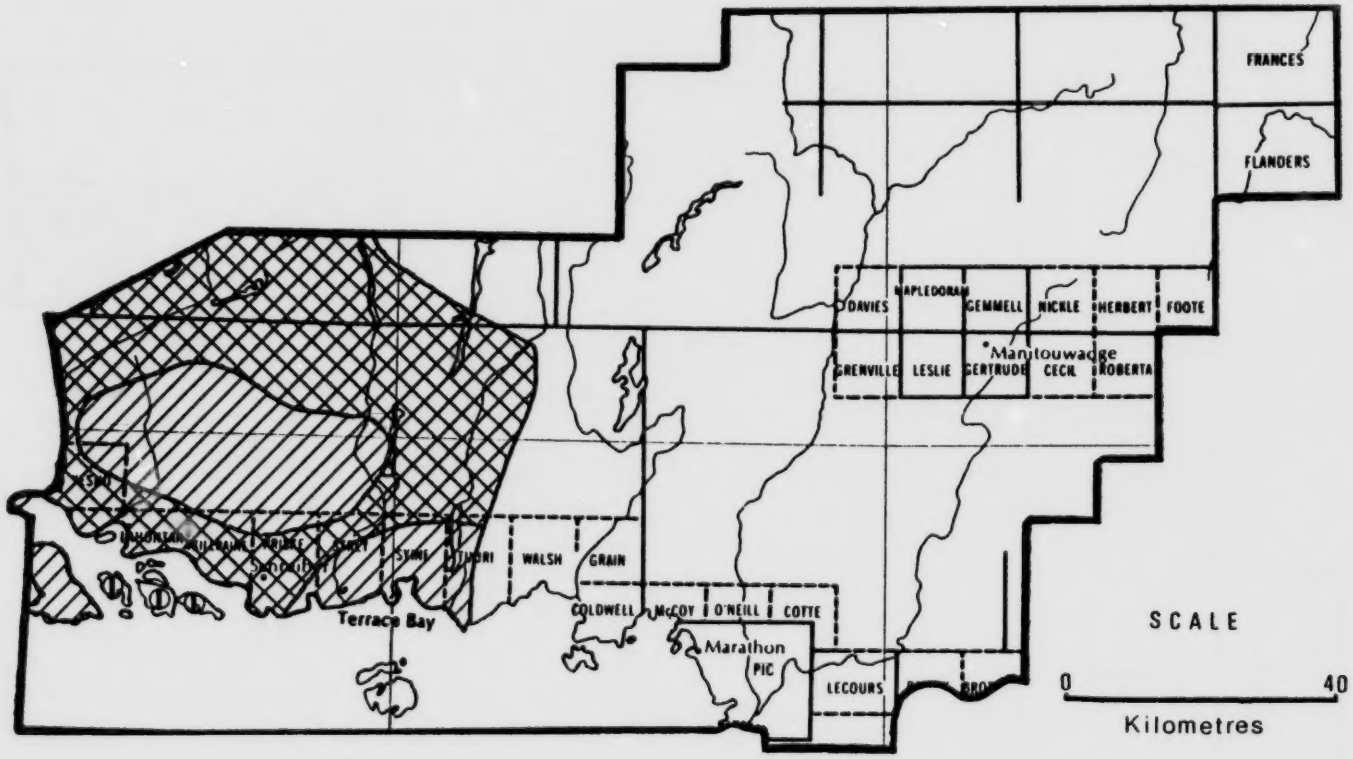
Areas within which defoliation occurred in 1958

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

TERRACE BAY DISTRICT



Spruce Budworm

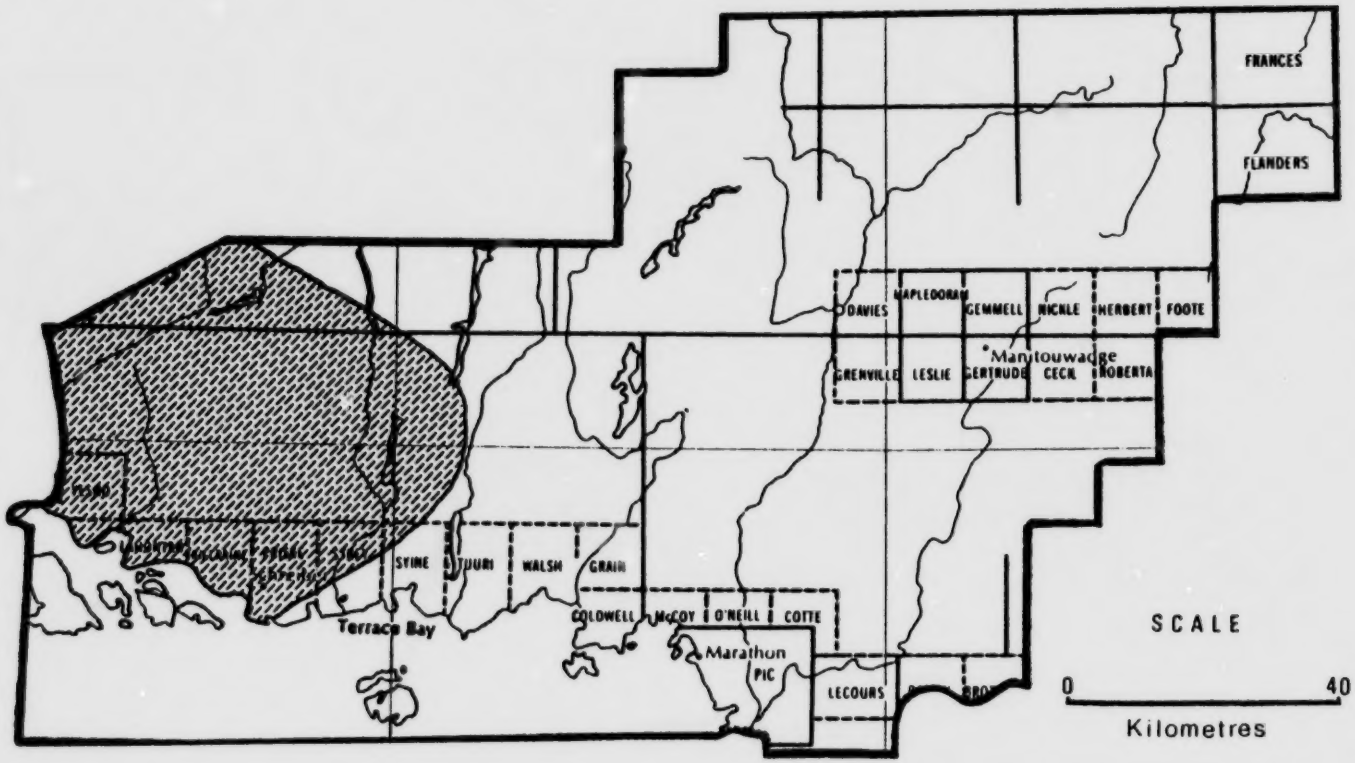
Areas within which defoliation occurred in 1959

LEGEND

Light defoliation ① or

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



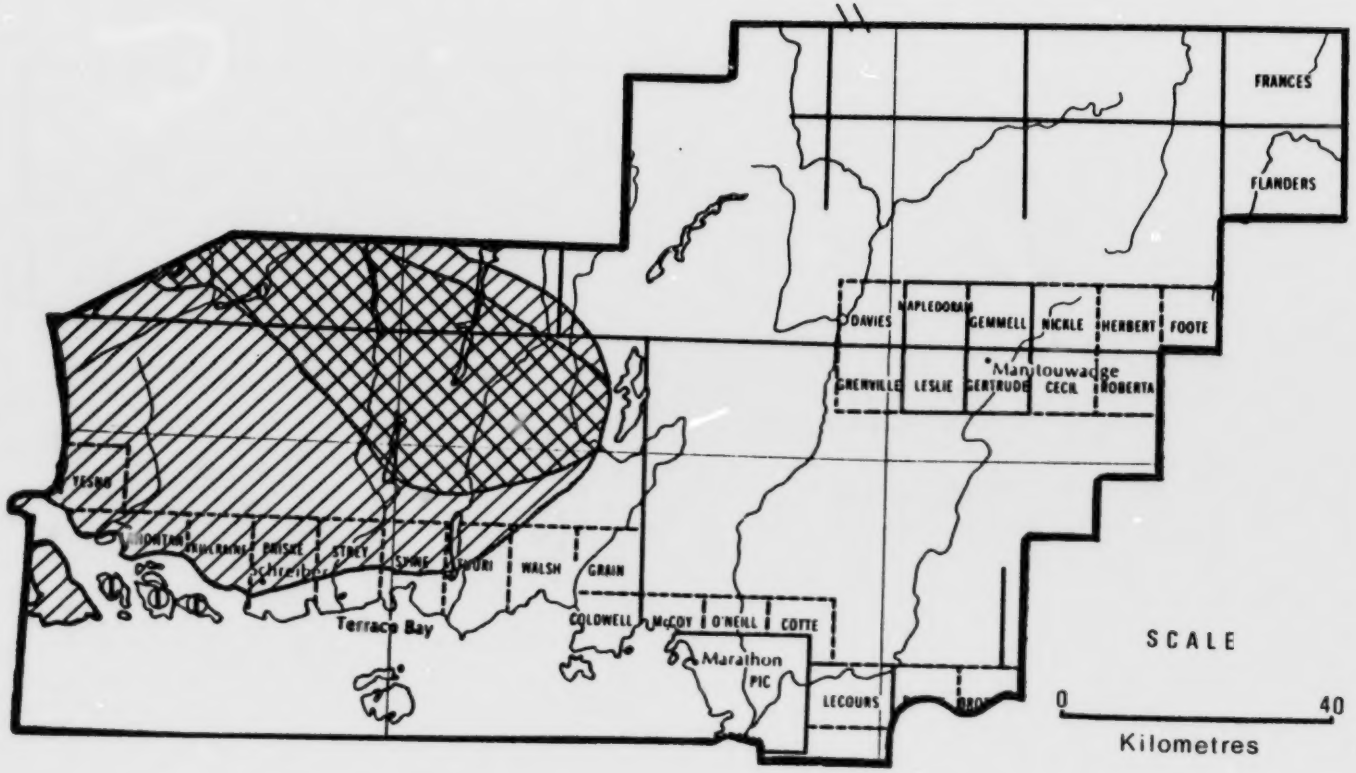
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred 1959

LEGEND

Mortality

TERRACE BAY DISTRICT



Spruce Budworm

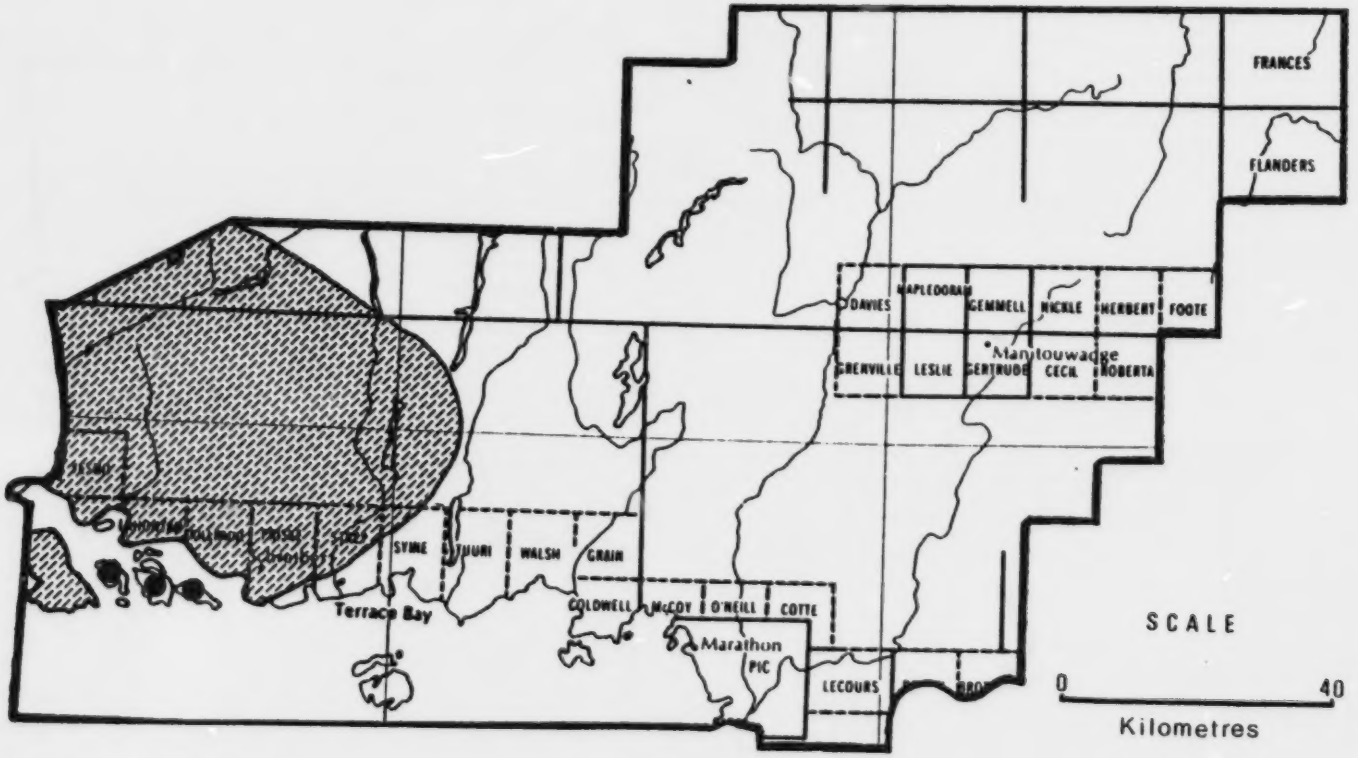
Areas within which defoliation occurred in 1960

LEGEND

Light defoliation ① or

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



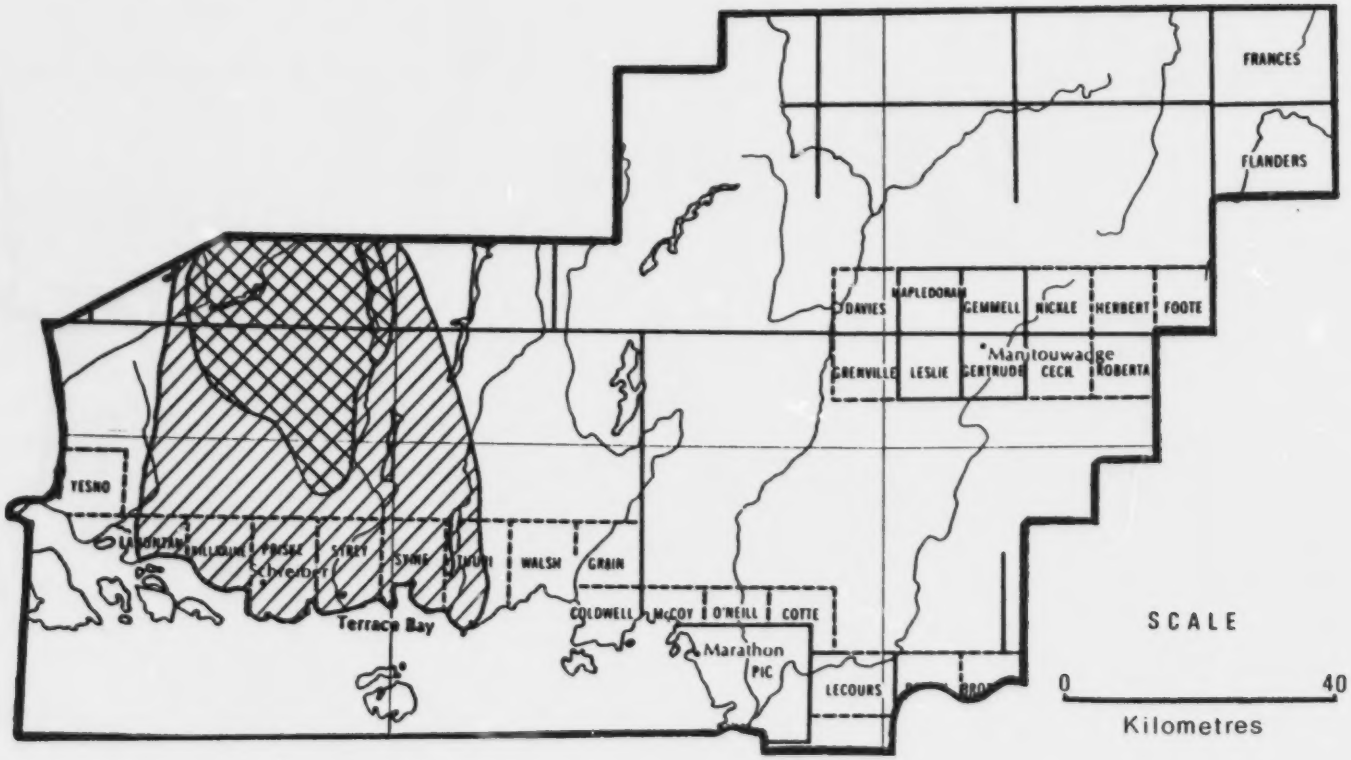
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1960

LEGEND

Mortality ● or ▨

TERRACE BAY DISTRICT



Spruce Budworm

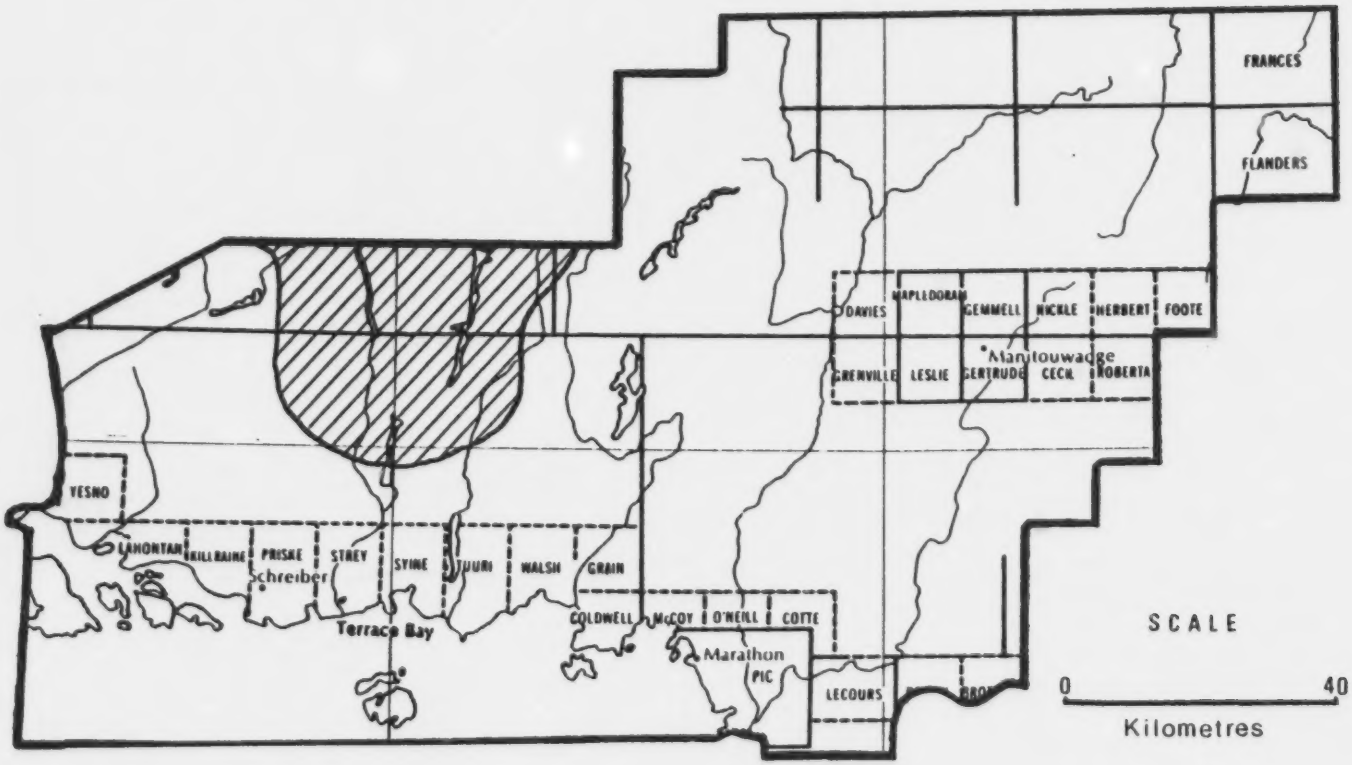
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



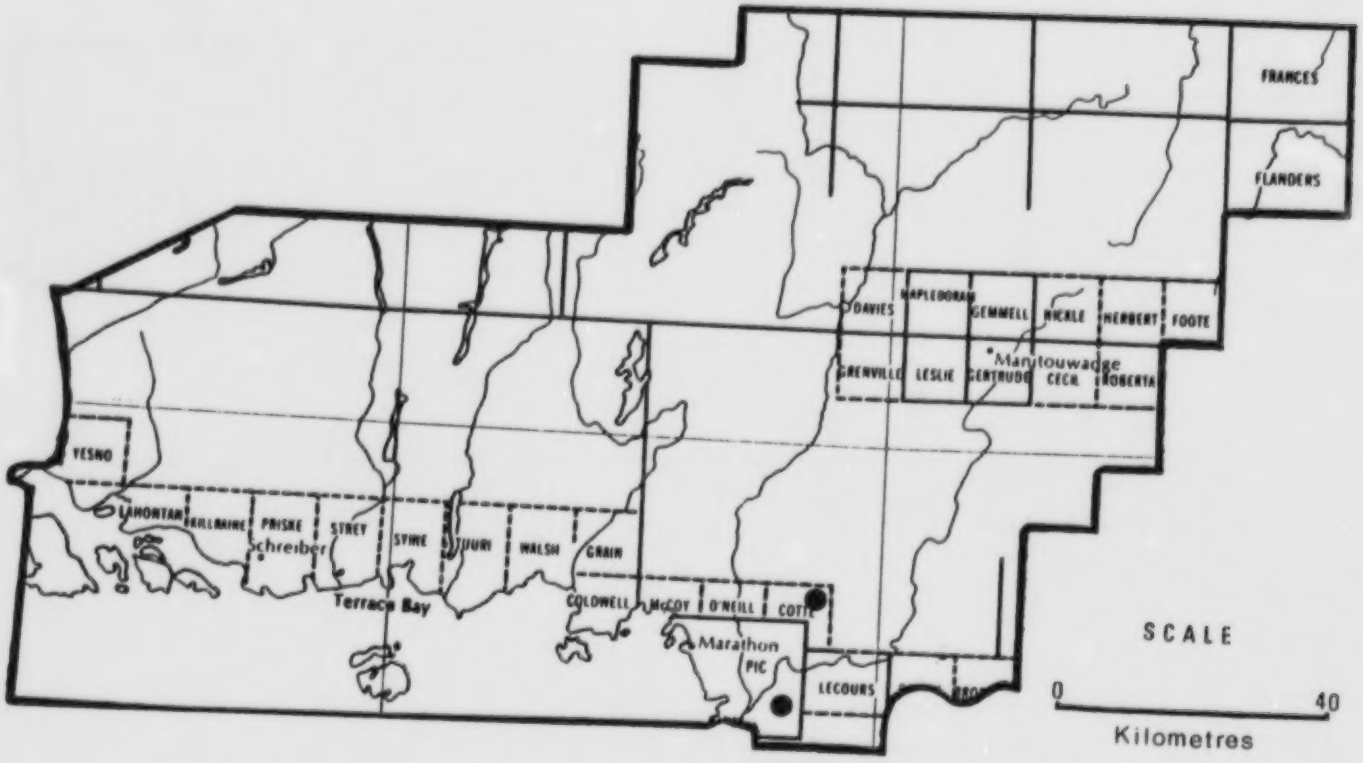
Spruce Budworm

Areas within which defoliation occurred in 1962

LEGEND

Light defoliation

TERRACE BAY DISTRICT



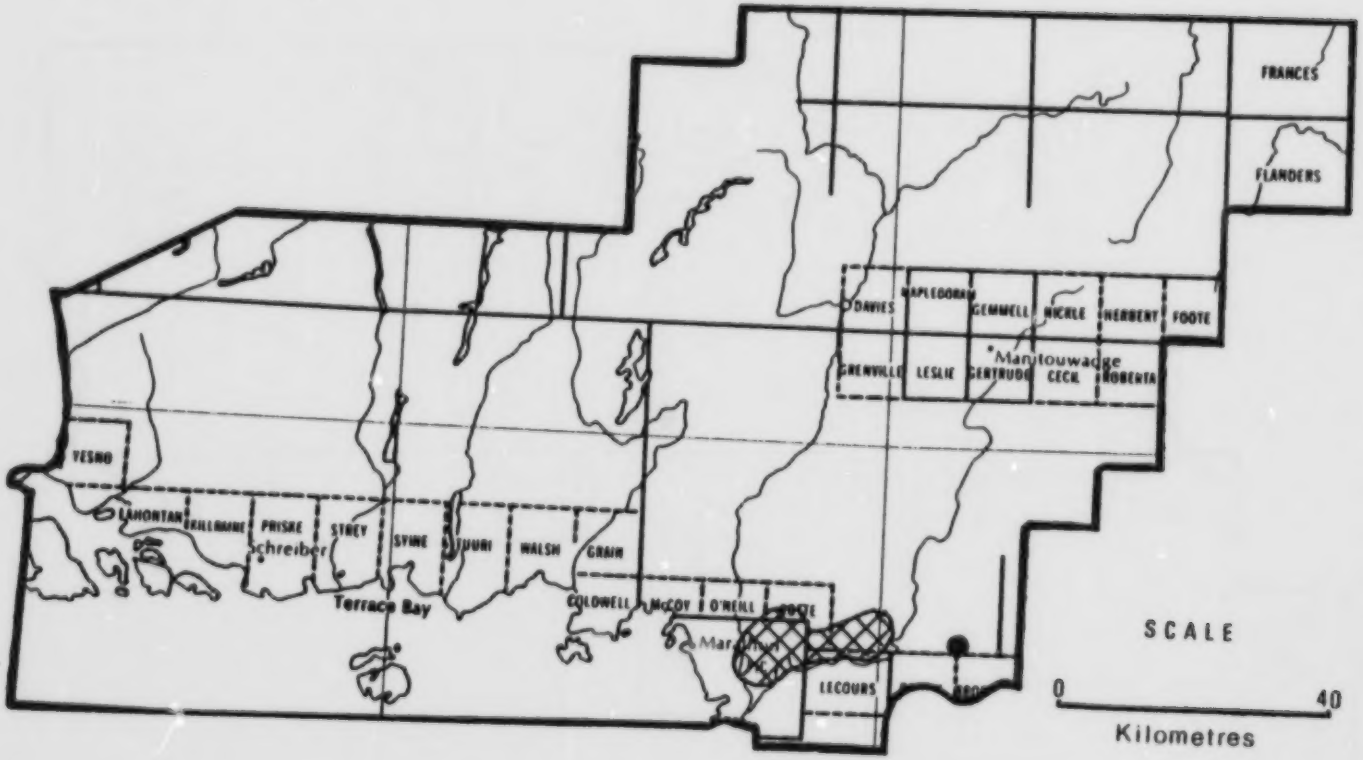
Spruce Budworm

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation ●

TERRACE BAY DISTRICT



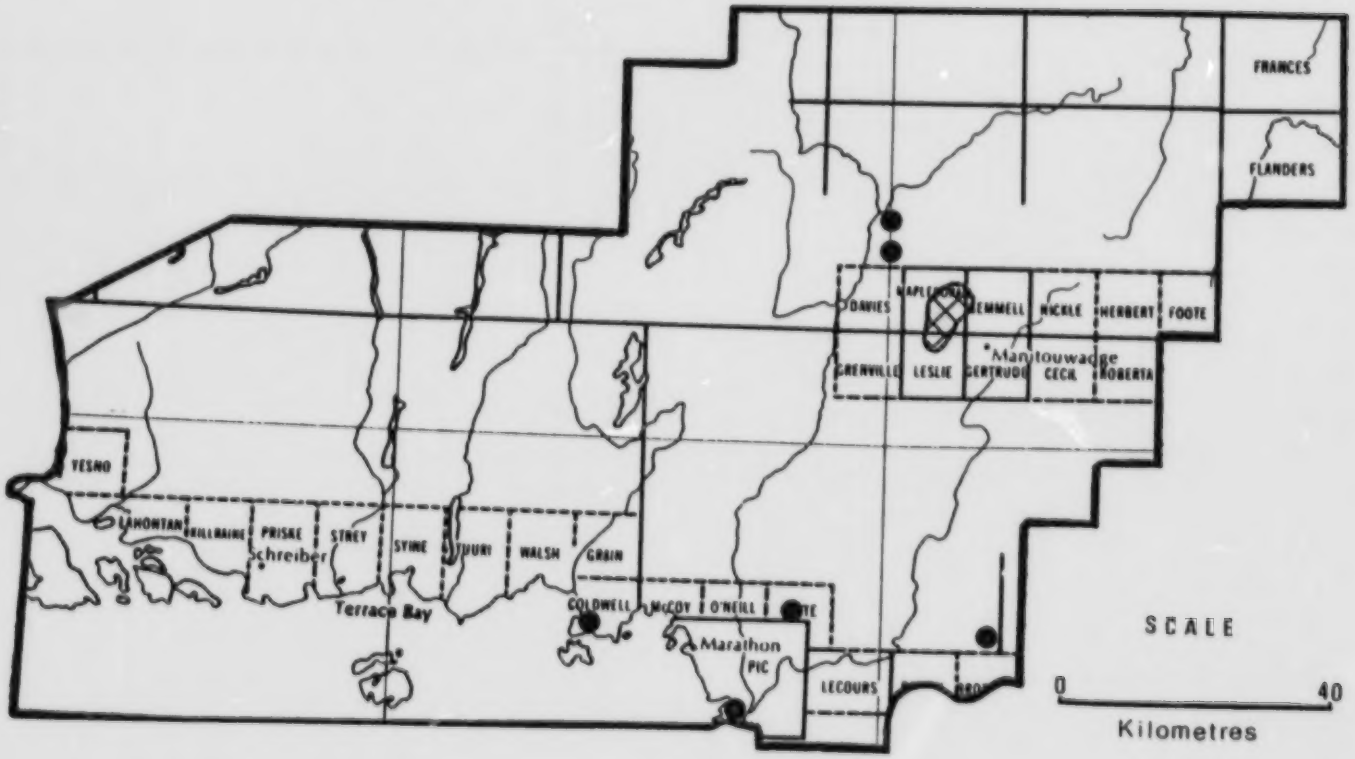
Spruce Budworm

Areas within which defoliation occurred in 1976

LEGEND

Moderate-to-severe defoliation ● or ▨

TERRACE BAY DISTRICT



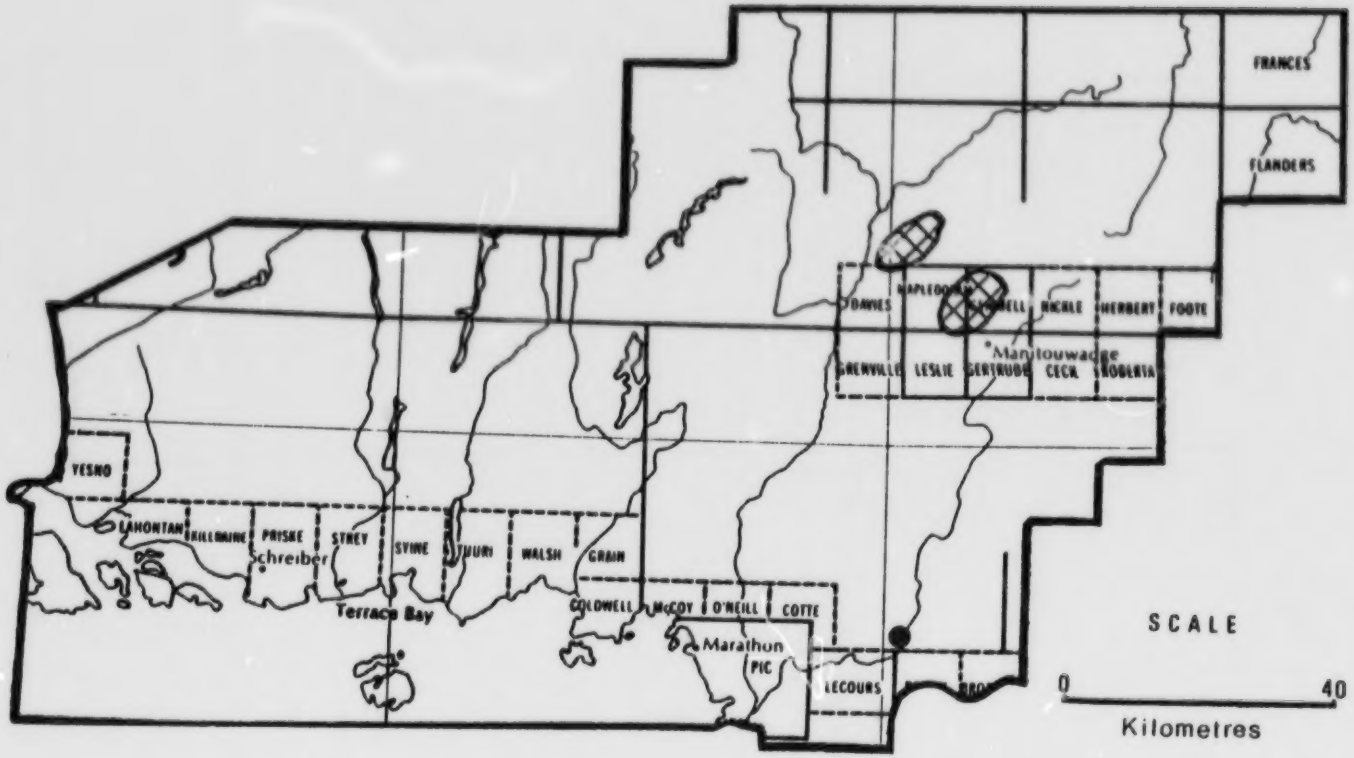
Spruce Budworm

Areas within which defoliation occurred in 1977

LEGEND

Moderate-to-severe defoliation ● or ▨

TERRACE BAY DISTRICT



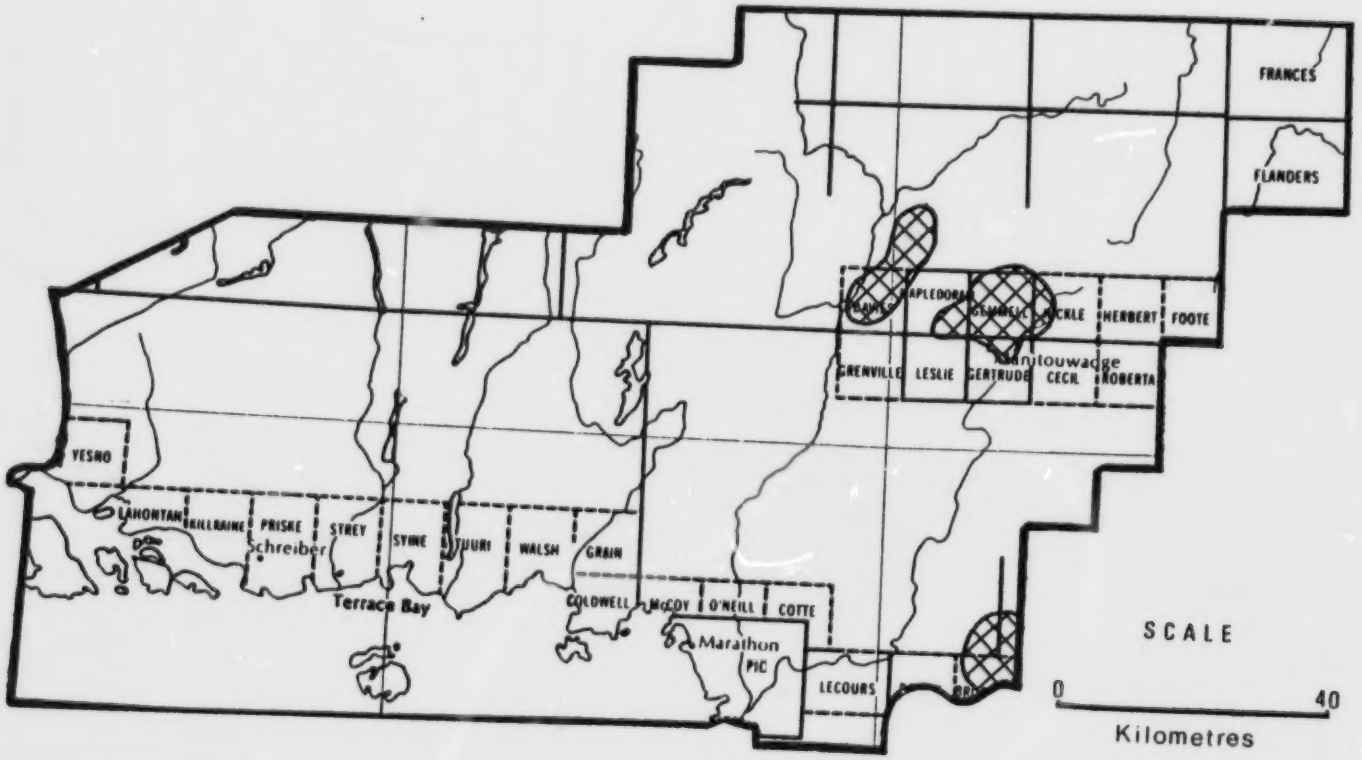
Spruce Budworm

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation ● or ▨

TERRACE BAY DISTRICT



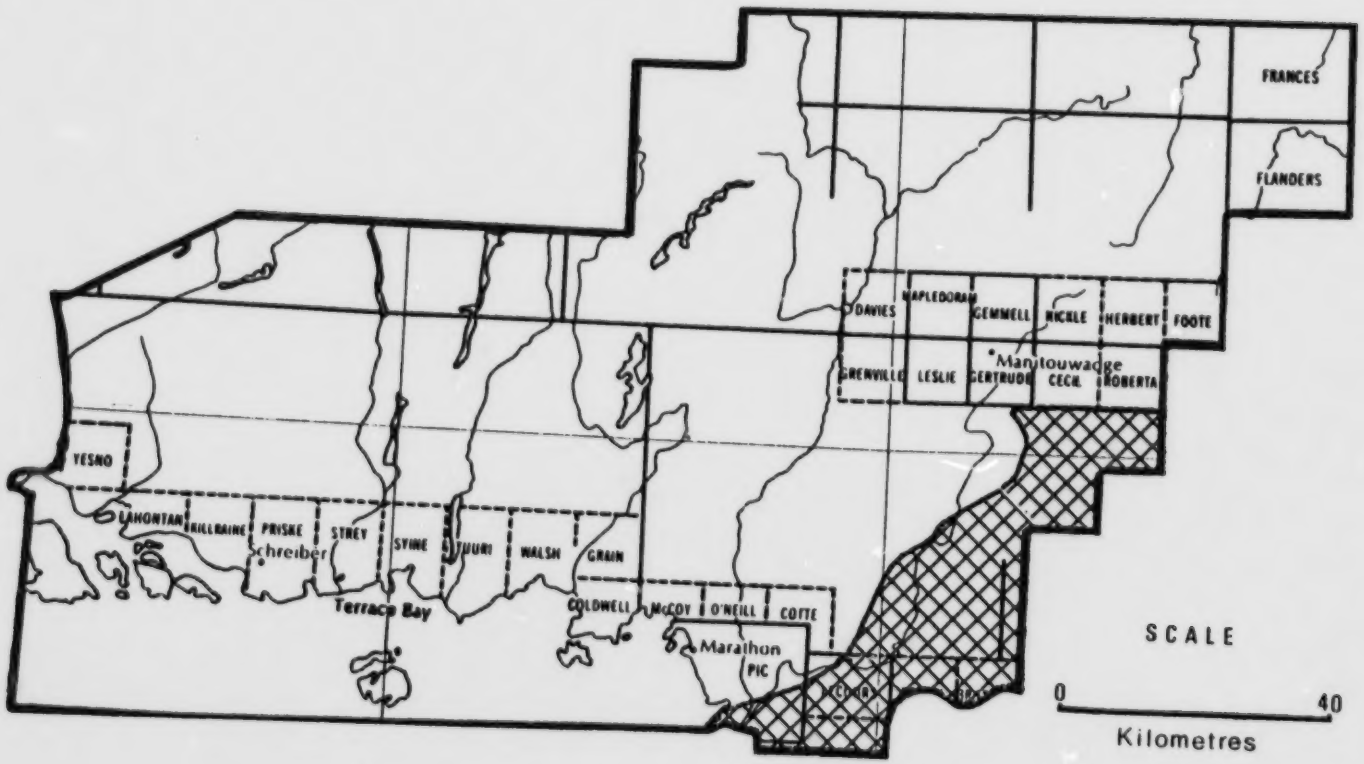
Spruce Budworm

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Spruce Budworm

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation

Larch Casebearer, *Coleophora laricella* (Hbn.)

Host(s): larch [Major]

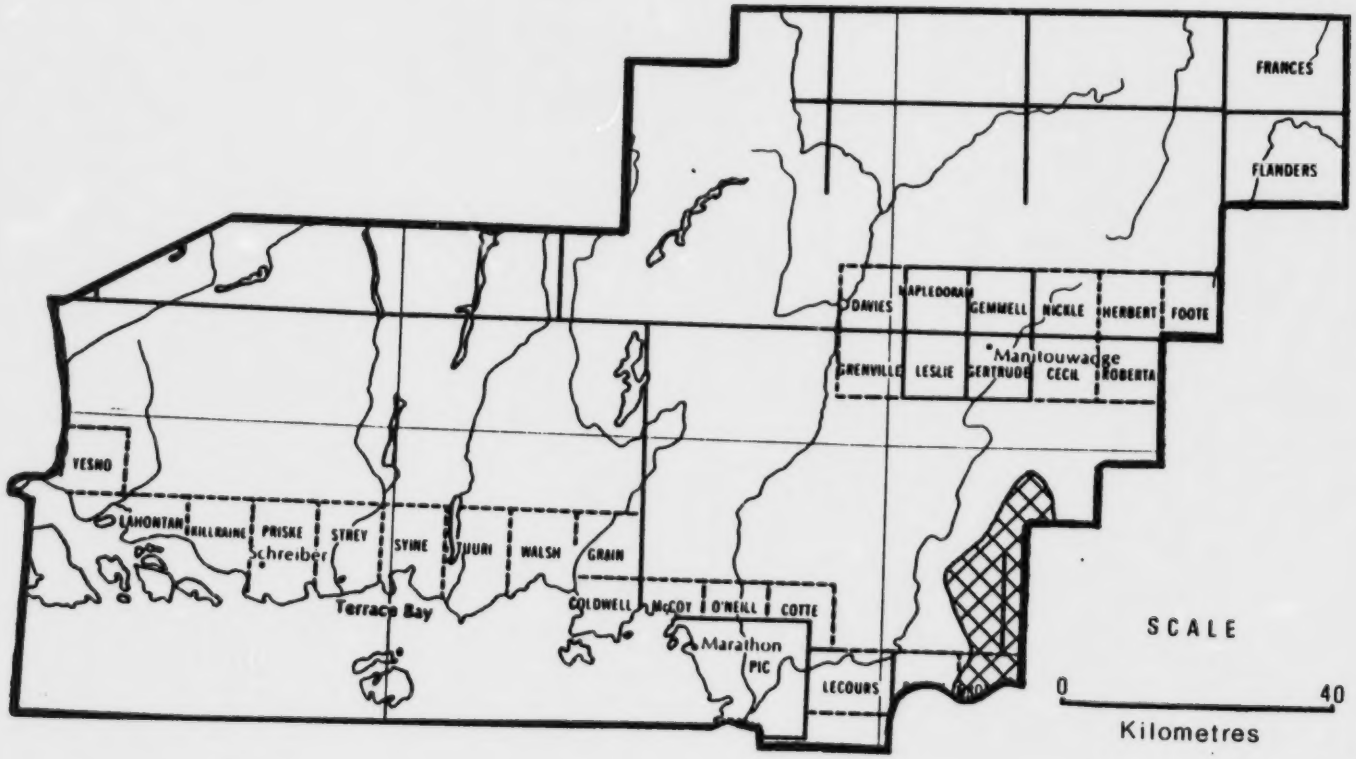
Year	Remarks
1950-1960	not reported
1961	This was the first District record. Low numbers were found at Pays Plat and Heron Bay, where larval counts averaged 1.3 and 1.2 larvae per 46-cm branch tip, respectively.
1962	Population levels remained low at Heron Bay and Pays Plat.
1963-1964	low populations recorded at Pays Plat and in Heron Bay and Tuuri Twp.
1965	Population levels declined at Pays Plat and in Heron Bay and Tuuri Twp.
1966-1969	trace populations
1970	A low population was reported at Pays Plat.
1971	not reported
1972	trace populations
1973-1980	not reported

Forest Tent Caterpillar, *Malacosoma disstria* (Hbn.)

Host(s): deciduous [Major]

Year	Remarks
1950	Moderate-to-severe defoliation of trembling aspen occurred in the southeast part of the District (see map, page 40).
1951	The moderate-to-severe defoliation reported in the south-eastern part of the District declined to trace levels.
1952	No infestations occurred in the District.
1953	Moderate-to-severe defoliation recurred along the Terrace Bay and White River District boundary (see map, page 41).
1954-1971	not reported
1972	light defoliation reported in Strey and Priske twps
1973-1975	not reported
1976	A small pocket of light defoliation occurred in Strey Twp.
1977-1980	not reported

TERRACE BAY DISTRICT



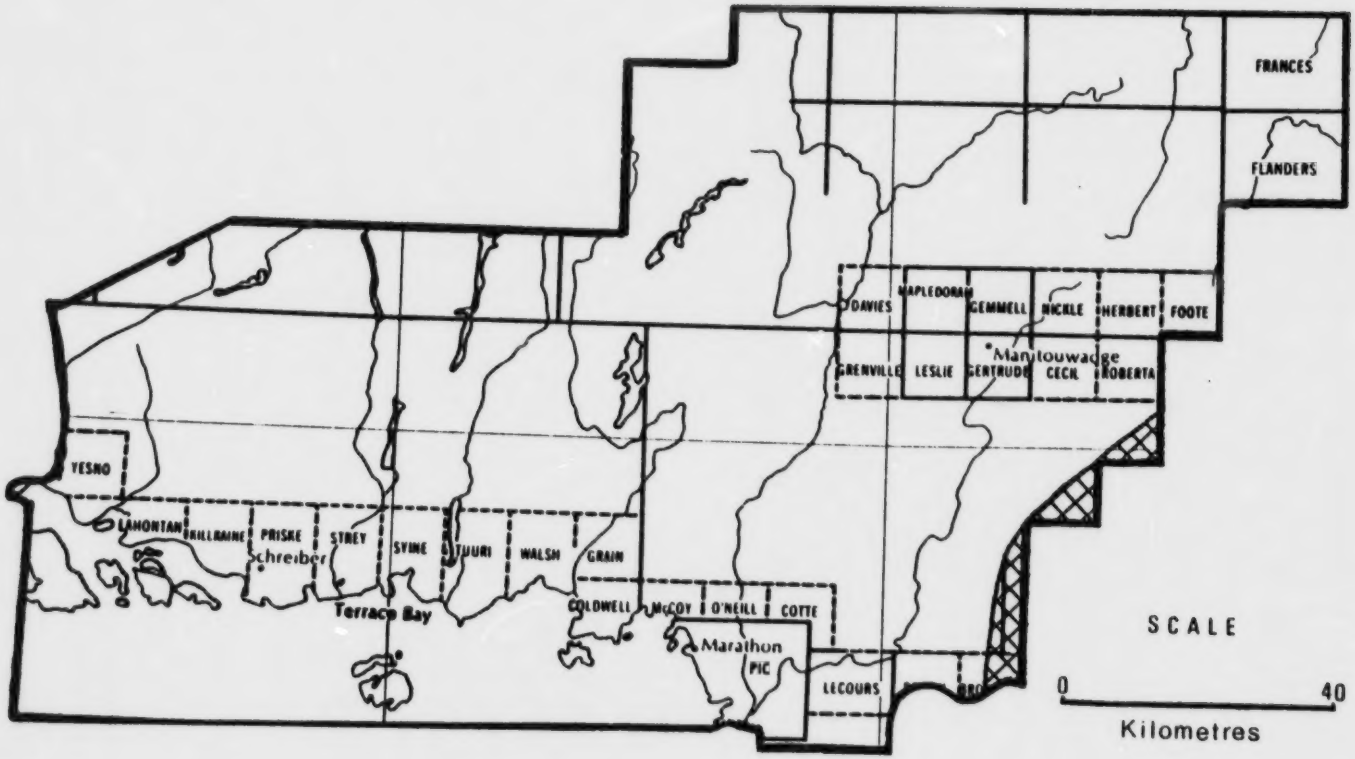
Forest Tent Caterpillar

Areas within which defoliation occurred in 1950

LEGEND

Moderate-to-severe defoliation

TERRACE BAY DISTRICT



Forest Tent Caterpillar

Areas within which defoliation occurred in 1953

LEGEND

Moderate-to-severe defoliation

Aspen Leafblotch Miner, *Phyllonorcyter ontario* (Free.)

Host(s): tA [Major]

Year	Remarks
1950	not reported
1951-1952	High population levels occurred 1 km west of Cavers Hill.
1953	High populations continued throughout the District.
1954	light infestations reported in the Stevens area
1955	not reported
1956	trace population reported throughout the District
1957-1959	low numbers reported in the southern part of the District
1960-1961	not reported
1962	Severe browning of foliage occurred in the Stevens and Hillsport areas of the District.
1963	Severe leafmining occurred in Priske Twp and in the Ramsay Lake area.
1964	Population levels collapsed in the District with only trace damage being observed.
1965	trace populations
1966	light populations observed in the District
1967	not reported
1968	light population levels reported
1969-1971	not reported
1972-1977	moderate-to-severe defoliation at many points in the District
1978	Light defoliation was common throughout most of the District.

(cont'd)

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.) (concl.)

Host(s): tA [Major]

Year	Remarks
1979	moderate-to-severe leafmining observed in the Black River area of Pic Twp and light leafmining elsewhere
1980	not reported

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

Host(s): spruce [Major]

Year	Remarks
1950-1960	not reported
1961	Moderate-to-severe defoliation occurred at Marathon and Heron Bay. Defoliation in these two areas ranged from 30 to 50%. At Coldwell 30% defoliation of black spruce regeneration was observed in a small clearing.
1962	Population levels declined to light in the Marathon and Heron Bay areas.
1963-1965	not reported
1966	Young black spruce and white spruce trees were heavily defoliated in the town of Marathon. Light defoliation was also observed on the south shore of Killala Lake.
1967	high populations reported on white spruce in Pic Twp
1968-1971	Light defoliation occurred at widely scattered locations in the District.
1972	not reported
1973	Light defoliation occurred in the eastern part of the District.
1974-1977	Varying degrees of infestation occurred on open-grown trees across the District.

(cont'd)

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.) (concl.)

Year	Remarks
1978	Moderate-to-severe defoliation was observed on fringe white spruce and black spruce along the Black River.
1979-1980	moderate-to-severe defoliation reported on ornamental plantings in the towns of Terrace Bay and Marathon

White Pine Weevil, *Pissodes strobi* (Peck)

Host(s): pine, spruce [Major]

Year	Remarks
1950	not reported
1951	light damage observed at widely scattered locations
1952-1956	not reported
1975	light damage observed at Hillsport
1958-1963	light damage reported at several locations with less than 4% of leaders killed
1964	causing 3% leader mortality on jack pine and 7% mortality on black spruce in the Stevens area
1965-1966	Light damage continued in the Stevens area.
1968	Population levels increased in the Stevens area, with 9% of black spruce leaders weeviled.
1969	Further increases were observed on black spruce, with 12% of leaders damaged.
1970-1980	light damage observed throughout the District.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Host(s): larch [Major]

Year	Remarks
1950	Moderate-to-severe defoliation occurred along Hwy 17 from Yesno Twp east to Priske Twp. Light damage occurred in the eastern half of Priske Twp and into Strey Twp.
1951	Moderate-to-severe defoliation continued in the Pays Plat area east to Terrace Bay along Hwy 17.
1952	Moderate-to-severe defoliation occurred in all larch stands in the Pays Plat and Rossport areas.
1953	Moderate-to-severe defoliation was observed in the District from Yesno Twp east to Tuuri Twp. In the eastern part of the District high numbers occurred in Lecours and Pic twps.
1954-1955	Population levels remained high along Hwy 17.
1956	High population levels continued in the Pays Plat area.
1957	Population levels declined at various locations, especially along Hwy 17 between Marathon and Pays Plat.
1958	Population levels increased at several locations in the District.
1959	Moderate-to-severe defoliation persisted in the Pays Plat area along Hwy 17, and light damage occurred elsewhere in the District.
1960	High population levels continued in the Pays Plat area however, infestations throughout the District were generally light.
1961	Infestations declined in the District.
1962-1965	light populations reported at scattered locations in the District
1966	light defoliation reported near the Pays Plat area of the District, and trace populations elsewhere
1967-1974	low population levels observed in the District

(cont'd)

Larch Sawfly, *Pristiphora erichsonii* (Htg.) (concl.)

Host(s): larch [Major]

Year	Remarks
1975-1976	Moderate-to-severe defoliation was reported in Pic Twp.
1977	Moderate-to-severe defoliation occurred in a 20 ha stand of larch east of the Pic River.
1978	Moderate-to-severe defoliation occurred near the Prairie River in Tuuri Twp, while light damage was present east of Marathon in Pic and Lecours twps.
1979	Moderate-to-severe defoliation recurred in Tuuri Twp and only trace populations occurred in Pic and Lecours twps.
1980	For the third consecutive year moderate-to-severe defoliation occurred in a 2.5 ha stand of larch in Tuuri Twp. Tree mortality is now occurring in this area.

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)

Host(s): mountain-ash [Major]

Year	Remarks
1950-1972	not reported
1973-1974	varying degrees of defoliation reported in the southeastern corner of the District
1975	Moderate-to-severe defoliation persisted in the southeastern corner of the District.
1976	high populations reported in the Marathon area and commonly found elsewhere in the District
1977	High population levels continued in the southeastern part of the District.

(cont'd)

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.) (concl.)

Year	Remarks
1978	Moderate-to-severe defoliation occurred from the southern end of the Manitouwadge highway and along Highway 17 to Marathon.
1979	Very light defoliation was observed along the north shore of Lake Superior.
1980	Populations increased to high numbers along the north shore of Lake Superior.

Ambermarked Birch Leafminer, *Profenusa thomsoni* (Konow)

Host(s): birch [Major]

Year	Remarks
1950-1960	not reported
1961	first district record; caused 40% defoliation in a small clump of birch at Pays Plat
1962	Moderate-to-severe defoliation continued on shoreline trees in the Pays Plat area.
1963	High populations of this insect continued for the third consecutive year in the Pays Plat area.
1964	Population levels declined in the Pays Plat area.
1965	low numbers found at Pays Plat
1966	trace populations reported in Pic, Yesno and Strey twps
1967-1969	trace populations
1970-1980	not reported

Spearmarked Black Moth, *Rheumaptera hastata* (L.)

Host(s): birch [Major]

Year	Remarks
1950-1962	not reported
1963	Moderate-to-severe skeletonizing of foliage occurred in a 6-km band along the Killala Lake Road and a small pocket of moderate-to-severe defoliation occurred in Yesno Twp.
1964	Population levels declined in the Killala Lake area and in Yesno Twp.
1965	trace populations
1966-1980	not reported

Other Noteworthy Insects

Eastern Blackheaded Budworm, *Acleris variana* (Fern.)

Host(s): spruce, bF [Major]

Year	Remarks
1950-1951	not reported
1952	trace populations
1953	Trace populations were reported at Killala Lake and in Lahontan Twp.
1954-1955	not reported
1956	trace populations
1957	not reported
1958	trace populations found on white spruce in Yesno Twp
1959-1966	trace populations
1967-1969	not reported
1970	trace populations
1971-1976	low numbers reported in the District
1977-1980	not reported

Uglynest Caterpillar, *Archips cerasivorana* (Fitch)

Host(s): cherry [Minor]

Year	Remarks
1950-1953	not reported
1954	trace populations
1955	not reported

(cont'd)

Uglynest Caterpillar, *Archips cerasivorana* (Fitch) (concl.)

Year	Remarks
1956-1957	numerous tents observed in an area south of Stevens
1958	High number of tents persisted in the Stevens area and along the Killala Lake road.
1959	high number of tents observed at Stevens and Hillsport and along the Killala Lake road
1960	High populations continued in the Hillsport area.
1961-1963	trace populations
1964-1969	not reported
1970-1971	trace populations
1972	Moderate-to-high populations observed at numerous locations
1973	Populations declined to low numbers.
1974	moderate-to-high numbers observed in the Diverson Road area
1975	observed at a few locations in the district
1976-1980	not reported

American Aspen Beetle, *Gonioctena americana* (Schaef.)

Host(s): poplar [Minor]

Year	Remarks
1950-1951	not reported
1952	moderate-to-severe skeletonizing of trees at Killala Lake and light damage reported elsewhere
1953-1957	not reported
1958	A small pocket of moderate-to-severe defoliation occurred at Cavers Hill.

(cont'd)

American Aspen Beetle, *Gonioctena americana* (Schaef.) (concl.)

Year	Remarks
1959	light skeletonizing of foliage at numerous locations
1960	trace populations
1961	Pockets of moderate-to-severe defoliation occurred in Strey Twp. Defoliation averaged 40%.
1962	trace populations
1963	light skeletonizing of foliage observed at Hillsport and Killala Lake; trace populations elsewhere
1964	A light infestation continued for the second year in the Hillsport area.
1965	Infestations continued for the third year on fringe trees at Hillsport.
1966	Population levels declined to low numbers in the Hillsport area.
1967-1969	not reported
1970	Light defoliation was observed in the Schreiber area. Trace damage was observed elsewhere in the District.
1971-1973	not reported
1974	trace populations
1975-1976	Light defoliation occurred in the Manitouwadge area.
1977	not reported
1978-1980	low numbers reported at widely scattered locations

Fall Webworm, *Hyphantria cunea* (Dru.)

Host(s): deciduous [Major]

Year	Remarks
1950-1954	not reported
1955	high number of tents observed in Walsh Twp
1956-1980	not reported

Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Gn.)

Host(s): deciduous, coniferous [Major]

Year	Remarks
1950-1960	not reported
1961-1962	trace populations
1963	not reported
1964-1965	trace populations
1966-1972	not reported
1973-1974	trace populations
1975-1980	not reported

Northern Tent Caterpillar, *Malacosoma californicum pluviale* Dyar

Host(s): cherry, aspen [Minor]

Year	Remarks
1950	not reported

(cont'd)

Northern Tent Caterpillar, *Malacosoma californicum pluviale* Dyar (concl.)

Year	Remarks
1951	low number of tents observed in the Pays Plat area
1952	numerous tents observed in the Killala Lake area
1953-1954	low numbers reported along highway 17 at Cavers Hill
1955-1957	not reported
1958	low number of tents reported in the Terrace Bay and Schreiber areas
1959	high number of tents observed at Cavers Hill; low numbers reported elsewhere
1960-1969	trace populations
1970-1974	low numbers of tents observed at numerous points in the District
1975-1980	not reported

Balsam Fir Sawfly, *Neodiprion abietis* complex

Host(s): bF, wS, bS [Major]

Year	Remarks
1950-1954	not reported
1955	Light infestations were found commonly from Syine Twp west to Yesno Twp along the trans-Canada highway.
1956-1962	not reported
1963-1965	trace numbers found in beating tray samples
1966	low numbers on shoreline black spruce trees at Killala Lake

(cont'd)

Balsam Fir Sawfly, *Neodiprion abietis* complex (concl.)

Year	Remarks
1967	trace populations
1968-1972	not reported
1973	low numbers found east of Marathon
1974-1975	trace populations found on balsam fir at several locations near Marathon
1976	not reported
1977	trace populations
1978-1980	not reported

Jack Pine Sawflies, *Neodiprion nanulus nanulus* Schedl., *N. pratti banksianae* Roh. and *N. virginianus* complex

Host(s): jP, rP [Major]

Year		Remarks
1950-1954		not reported
1955-1965	*N. virginianus* complex	low populations
1966-1973	*N. virginianus* complex	low populations
1966-1973	*N. nanulus nanulus*	trace populations
1974-1977	*N. virginianus* complex	low populations
1974-1977	*N. nanulus nanulus*	trace populations
1974-1977	*N. pratti banksianae*	trace populations
1978-1980	*N. virginianus* complex	low populations
1978-1980	*N. nanulus nanulus*	trace populations

Mourningcloak Butterfly, *Nymphalis antiopa* (L.)

Host(s): deciduous [Minor]

Year	Remarks
1950-1953	not reported
1954	low numbers of tents observed in Lahontan Twp
1955	low numbers of tents observed in Walsh and Yesno twps
1956	trace populations
1957-1965	not reported
1966	trace population levels observed at Coldwell
1967	causing up to 40% defoliation on willow in Yesno Twp
1968-1975	not reported
1976	widely scattered colonies
1977-1978	not reported
1979	defoliation of individual trees at only a few locations
1980	not reported

Northern Pitch Twig Moth, *Petrova albicapitana* (Busck)

Host(s): jP [Minor]

Year	Remarks
1950-1957	not reported
1958	trace populations found at Hillsport
1959-1960	not reported
1961	trace populations reported in Yesno Twp

(cont'd)

Northern Pitch Twig Moth, *Petrova albicapitana* (Busck) (concl.)

Year	Remarks
1962-1967	not reported
1968	trace populations reported in Stevens and Priske twps
1969	trace populations recorded at Stevens
1970	not reported
1971-1974	trace populations
1975-1976	commonly found in the District
1977-1980	not reported

Greenheaded Spruce Sawfly, *Pikonema dimmockii* (Cress.)

Host(s): spruce [Minor]

Year	Remarks
1950-1951	not reported
1952	trace populations
1953	not reported
1954	trace populations found in Lahontan Twp
1955-1959	not reported
1960	trace populations found at Cavers Hill along highway 17
1961-1970	not reported
1972-1975	trace populations
1976	not reported
1977	trace populations
1978-1980	not reported

(cont'd)

Spruce Bud Midge, *Rhabdophaga swainei* Felt

Host(s): spruce [Minor]

Year	Remarks
1950-1957	not reported
1958-1959	trace numbers observed along highway 17 in the Terrace Bay area
1960-1963	trace populations
1964	causing 5% damage to terminal buds at one location in Terrace Bay
1965	light population levels reported at Terrace Bay and in Pic Twp
1966	low numbers found in Priske Twp along highway 17
1967	low numbers observed in Pic and Priske twps
1968	low numbers of infested shoots at Stevens and in Pic and Syine twps
1969-1970	not reported
1971-1978	trace populations
1979-1980	not reported

Spruce Bud Moth, *Zeiraphera canadensis* Mut. & Free.

Host(s): spruce [Minor]

Year	Remarks
1950-1955	not reported
1956	Moderate-to-severe defoliation occurred on open-grown white spruce trees east of Rossport.
1957-1964	not reported
1965	8% of current shoots infested on 10 sample trees in Pic Twp
1966-1969	not reported
1970-1971	Moderate-to-severe defoliation occurred on plantation white spruce trees near Marathon.
1972-1973	not reported
1974	trace populations
1975	not reported
1976-1977	high numbers reported in the Pic River area
1978	not reported
1979-1980	trace levels

DISEASES

Armillaria Root Rot, *Armillaria mellea* [Vahl : Fr.] Kummer

Host(s): coniferous

[Major]

Year	Remarks
1950-1966	not reported
1967	low infection levels throughout the District
1968-1973	not reported
1974	2% infection in the Hagerty and Black Creek areas
1975	not reported
1976	causing 10% mortality in a 12-ha black spruce plantation in the Hillsport area
1977	10% of jack pine trees dead at one location in Herbert Twp
1978-1980	averaging 2% mortality across the District

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Host(s): pine

[Major]

Year	Remarks
1950-1965	not reported
1966	first District records; up to 41% mortality in the Stevens area and high degrees of infection in Pic and Strey twps (see map, page 63)
1967	Exceeding 86% mortality in a red pine plantation in Pic Twp and 38% mortality in a jack pine plantation in Davies Twp (see map, page 64)
1968	Mortality levels decreased in the District. In the Stevens area 50% of the trees were infected and there was 32% mortality.

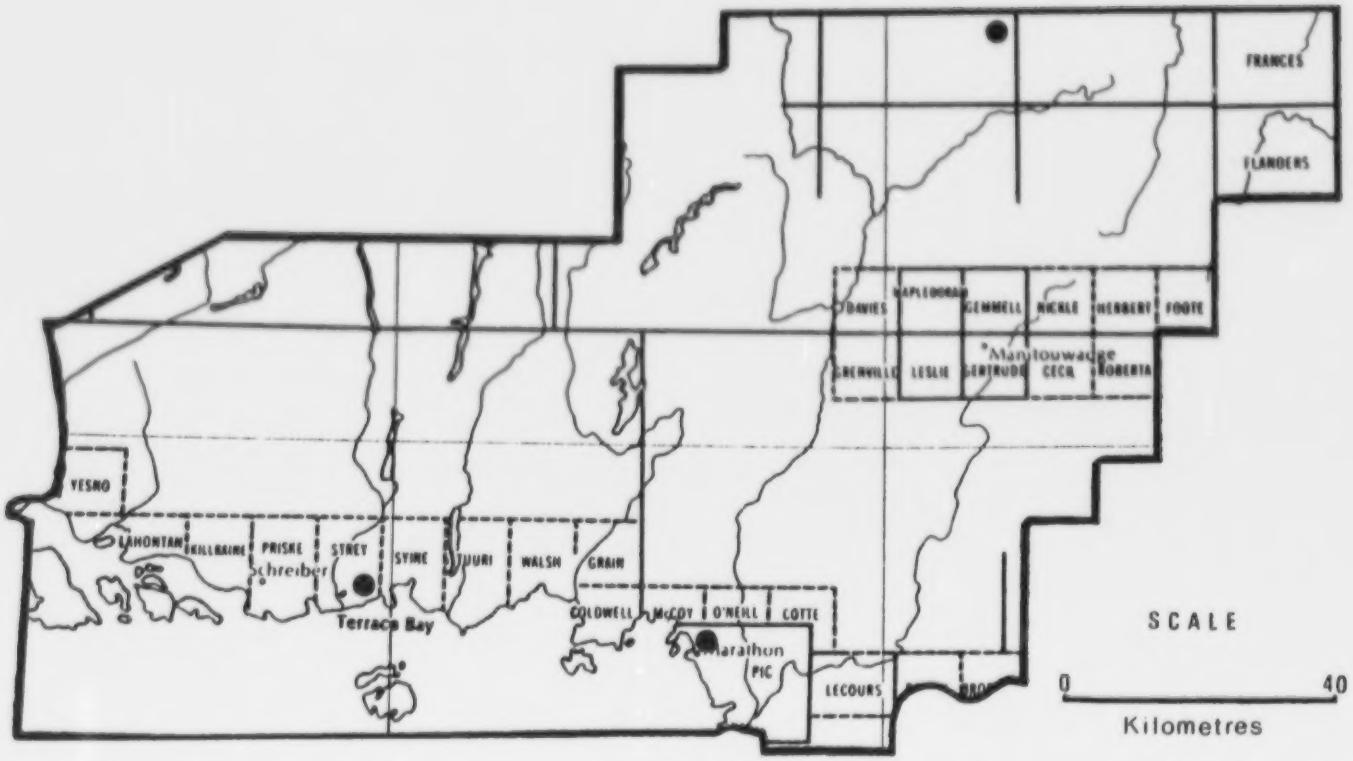
(cont'd)

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard (concl.)

Year	Remarks
1969	not reported
1970	In the Hillsport and Stevens area, 80% infection was reported in jack pine plantations.
1971	high levels of infections reported in Pic Twp and near the junction of Hillsport and the Manitouwadge Road
1972	High infection levels were reported in the Hillsport and Manitouwadge areas and at the Boy Scout plantation near Marathon.
1973	Infections in the Manitouwadge and Hillsport areas declined to light intensity. Small pockets of light intensity also occurred at Marathon and Terrace Bay.
1974	Numerous areas of infections were reported across the District (see map, page 65). The most significant damage was observed in Nickle Twp, where 70% of jack pine trees were affected and there was 18% mortality.
1975	There was a decline in the incidence of this disease at sample points in the District. Mortality in Nickle Twp was 20%.
1976	The incidence of this disease averaged 35% at five sample points in the District and mortality averaged 4.2%.
1977	The incidence of this disease averaged 27% at six sample points in the District and there was 3% mortality.
1978-1980	trace infections

(cont'd)

TERRACE BAY DISTRICT



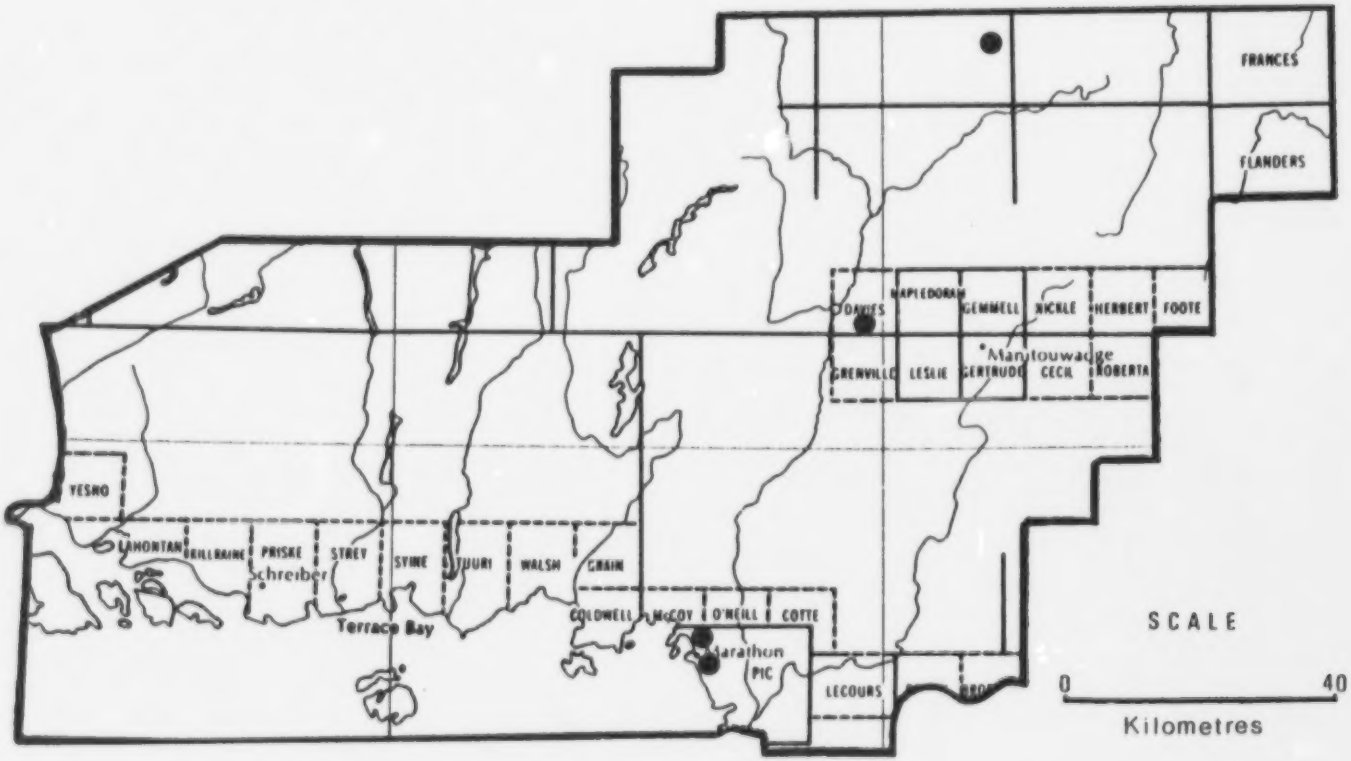
Scleroderris Canker

Locations of infection centres
in 1966

LEGEND

Infection centres ●

TERRACE BAY DISTRICT



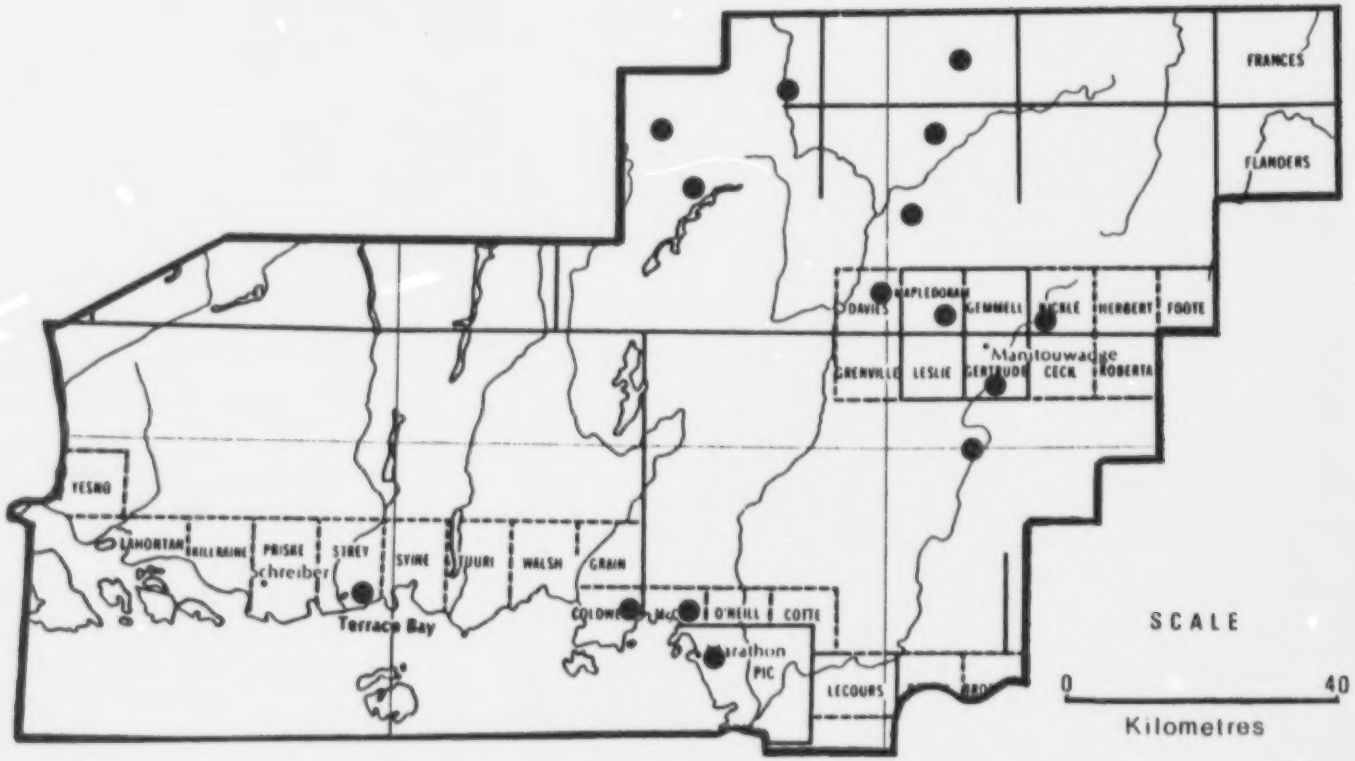
Scleroderris Canker

Locations of infection centres
in 1967

LEGEND

Infection centres ●

TERRACE BAY DISTRICT



Scleroderris Canker

Locations of infection centres
in 1974

LEGEND

Infection centres ●

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *C. ledicola* (Peck) Lagerh.

Host(s): spruce [Major]

Year	Remarks
1950-1953	not reported
1954-1957	Moderate-to-severe infection occurred at the junction of Highway 17 and Jackfish Road in Syine Twp.
1958	Infection levels declined in the Jackfish Road area.
1959	Moderate-to-severe infection recurred at the junction of Jackfish Road and Highway 17.
1960	low infections reported in Turri and Priske twps
1961	trace levels
1962	High levels of infection occurred in Pic and Syine twps, and along the Jackfish Road.
1963	Moderate-to-severe damage recurred along the Jackfish Road and at Heron Bay. Light foliar damage was recorded at Coldwell.
1964	Moderate-to-severe infections occurred in Syine, Pic, Priske and Coldwell twps.
1965	not reported
1966	low incidence reported along the Jackfish Road
1967	low infections
1968	moderate-to-severe infections reported in a 2-ha plantation in Priske Twp
1969-1970	not reported
1971	low levels of infection reported in the Schreiber and Terrace Bay areas
1972	trace levels

(cont'd)

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *C. ledicola* (Peck) Lagerh. (concl.)

Host(s): spruce [Major]

Year	Remarks
1973	high incidence reported at Marathon, Neys Park, Jackfish Lake Tower and Camp 56, American Can Company
1974	Quantitative sampling revealed 100% incidence at five locations, with an average of 62% foliar damage.
1975	Moderate-to-severe defoliation occurred on open-grown, fringe trees in Pic Twp and west along highway 17 to Jackfish Lake.
1976	Moderate-to-severe defoliation occurred in Neys Provincial Park and along the Manitouwadge Road. Light foliar damage was present in the Hillsport area.
1977-1980	trace levels

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver

Host(s): aspen [Major]

Year	Remarks
1950-1957	not reported
1958-1962	light infection at widely scattered locations in the District
1963	light infection in the Stevens area and trace damage elsewhere
1964-1965	trace levels
1966-1967	not reported
1968	varying levels of infection reported at widely scattered locations

(cont'd)

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver (concl.)

Year	Remarks
1969	not reported
1970	severe infection reported in the Hillsport area
1971-1972	Infection declined to a low level in the Hillsport area.
1973	trace levels
1974	Pockets of high infection recurred in the Hillsport area.
1975	Population levels declined to light intensity.
1976	not reported
1977-1978	varying degrees of damage observed at numerous locations
1979	caused 48% foliar damage at one location along highway 614
1980	trace levels

Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur

Host(s): pine [Major]

Year	Remarks
1950-1968	not reported
1969	35% of trees affected in a 4-ha plantation and 5% mortality in Pic Twp
1970-1972	low infection reported in Pic Twp
1973	causing 2% mortality in a 2-ha jack pine plantation near Marathon
1974-1976	not reported
1977	one collection reported in the Camp 70 area
1978-1980	not reported

Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats.

Host(s): pine [Major]

Year	Remarks
1950-1962	not reported
1963	trace number of galls found in Killraine Twp
1964-1974	not reported
1975	low number of galls observed in the Boy Scout plantations near the town of Marathon
1976-1980	commonly found in the District

Shoot Blight, *Venturia macularis* (Fr.) Müller & v. Arx

Host(s): tA [Major]

Year	Remarks
1950-1954	not reported
1955	Moderate-to-severe infections occurred in Yesno Twp.
1956-1969	not reported
1970-1971	trace infections
1972	55% of trees infected in a small stand in the Stevens area
1973-1975	trace infections
1976	low infections reported in a 40 ha stand in the Stevens area
1977	low infections at widely scattered points
1978	Quantitative counts at five locations revealed an average of 83% incidence and 63% foliar damage.
1979	90% of leaders killed in a 50-ha stand of aspen regeneration in Davies Twp
1980	not reported

Other Noteworthy Diseases

Hypoxylon Canker, *Hypoxylon mammatum* (Wahlenb.) J. Miller

Host(s): aspen [Major]

Year	Remarks
1950-1954	not reported
1955	low levels of infection along highway 17 from Pays Plat east to Terrace Bay
1956-1963	not reported
1964	trace infections observed
1965	not reported
1966-1968	light infection in the District
1969	not reported
1970-1975	common throughout the District
1976-1977	not reported
1978	trace infections observed
1979-1980	not reported

ABIOTIC DAMAGE

Frost

Year	Remarks
1950-1963	not reported
1964	88% of balsam fir shoots killed at one location in Pic Twps and 68% of shoots damaged on white spruce at this location
1965-1968	not reported
1969	moderate-to-severe damage to new buds on white and black spruce at many points in Pic Twp, 50% foliar damage on many roadside larch
1970-1976	not reported
1977	moderate-to-severe damage throughout the District
1978	Moderate-to-severe damage was reported. At one location in the Terrace Bay area, 98% of white spruce were affected with 28% foliar damage.
1979	Light damage was observed on scattered balsam fir in Herbert Twp.
1980	Moderate-to-severe damage occurred in the eastern part of the District especially, on white and black spruce and balsam fir. At one location in Davies Twp, 5-year-old white spruce suffered 66% foliar damage.

Snow

Year	Remarks
1950-1964	not reported
1965	light breakage of twigs in the upper crowns of jack pine throughout the Marathon Boy Scout tree farm in Pic Twp
1966-1980	not reported

Winter Drying

Date	Remarks
1950-1973	not reported
1974	Moderate-to-severe damage occurred on young jack pine plantings in the Manitou Falls area.
1975	Quantitative counts in Pic, Coldwell and Strey twps revealed an average of 50% foliar damage on regeneration red pine.
1976	25% foliar damage to red pine trees at several locations in the district
1977	10% foliar damage on jack pine in Nickle Twp
1978-1980	not reported

APPENDICES

APPENDIX A

DECIDUOUS HOST

Common Name	Scientific Name	Abbreviations
Alder	*Alnus* spp.	Al
Apple	*Malus*	Ap
Ash, black	*Fraxinus nigra* Marsh.	As
Aspen, largetooth	*Populus grandidentata* Michx.	lA
trembling	*tremuloides* Michx.	tA
Basswood	*Tilia* spp.	Ba
Beech	*Fagus grandifolia* Ehrh.	Be
Birch, white	*Betula papyrifera* Marsh.	wB
yellow	*alleghaniensis* Britt.	yB
Butternut	*Juglans cinerea* L.	Bu
Cherry, eastern choke	*Prunus virginiana* L.	eaCh
pin	*penesylvanica* L.f.	pCh
Elm, white	*Ulmus americana* L.	wE
Horse-chestnut	*Aesculus hippocastanum* L.	hChe
Ironwood	*Ostrya* spp.	I
Maple, Manitoba	*Acer negundo* L.	mM
red	*rubrum* L.	rM
sugar	*saccharum* Marsh.	sM
Mountain-ash, American	*Sorbus americana* Marsh.	aMo
Oak, bur	*Quercus macrocarpa* Michx.	bO
red	*rubra* L.	rO
Poplar, balsam	*Populus balsamifera* L.	bPo
Carolina	*eugenei* Simon-Louis	cPo
Lombardy	*nigra* L.	lPo
silver	*alba* L.	sPo
Willow	*Salix* spp.	W

APPENDIX B

CONIFEROUS HOST

Common Name	Scientific Name	Abbreviations
Cedar, eastern white	*Thuja occidentalis* L.	eC
Fir, balsam	*Abies balsamea* (L.) Mill.	bF
Larch	*Larix laricina* (Du Roi) K. Koch	tL
Pine, Austrian	*Pinus nigra* Arn.	aP
eastern white	*strobus* L.	wP
jack	*banksiana* Lamb.	jP
mugho	*mugho* Turra	mP
red	*resinosa* Ait.	rP
Scots	*sylvestris* L.	scP
Spruce, black	*Picea mariana* (Mill.) B.S.P.	bS
Colorado	*pungens* (Engelm.	colS
Norway	*abies* (L.) Karst.	nS
red	*rubens* Sarg.	rS
white	*glauca* (Moench) Voss	wS

APPENDIX C

MAPS - NORTHWESTERN ONTARIO

NORTHWESTERN ONTARIO

Large Aspen Tortrix

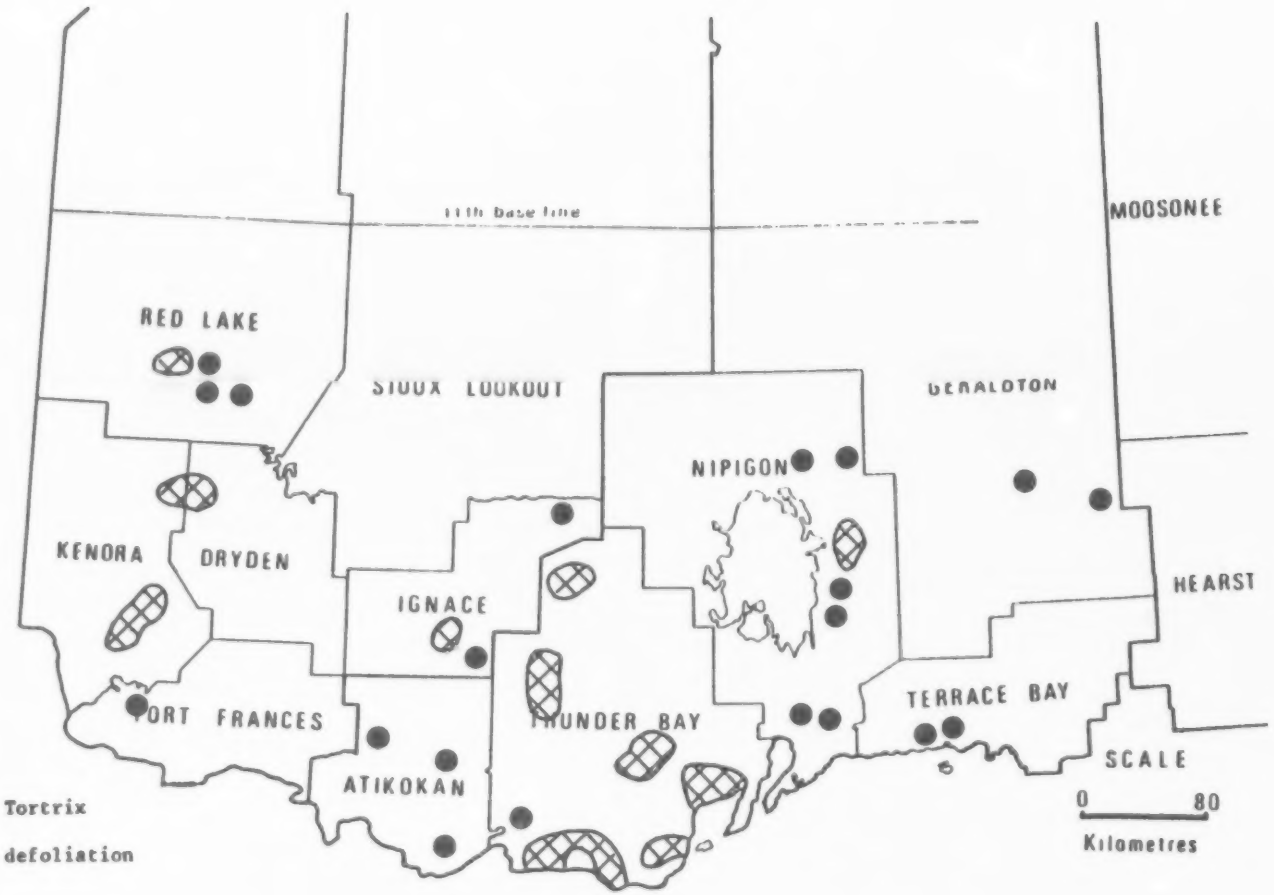
Areas within which defoliation occurred in 1970

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



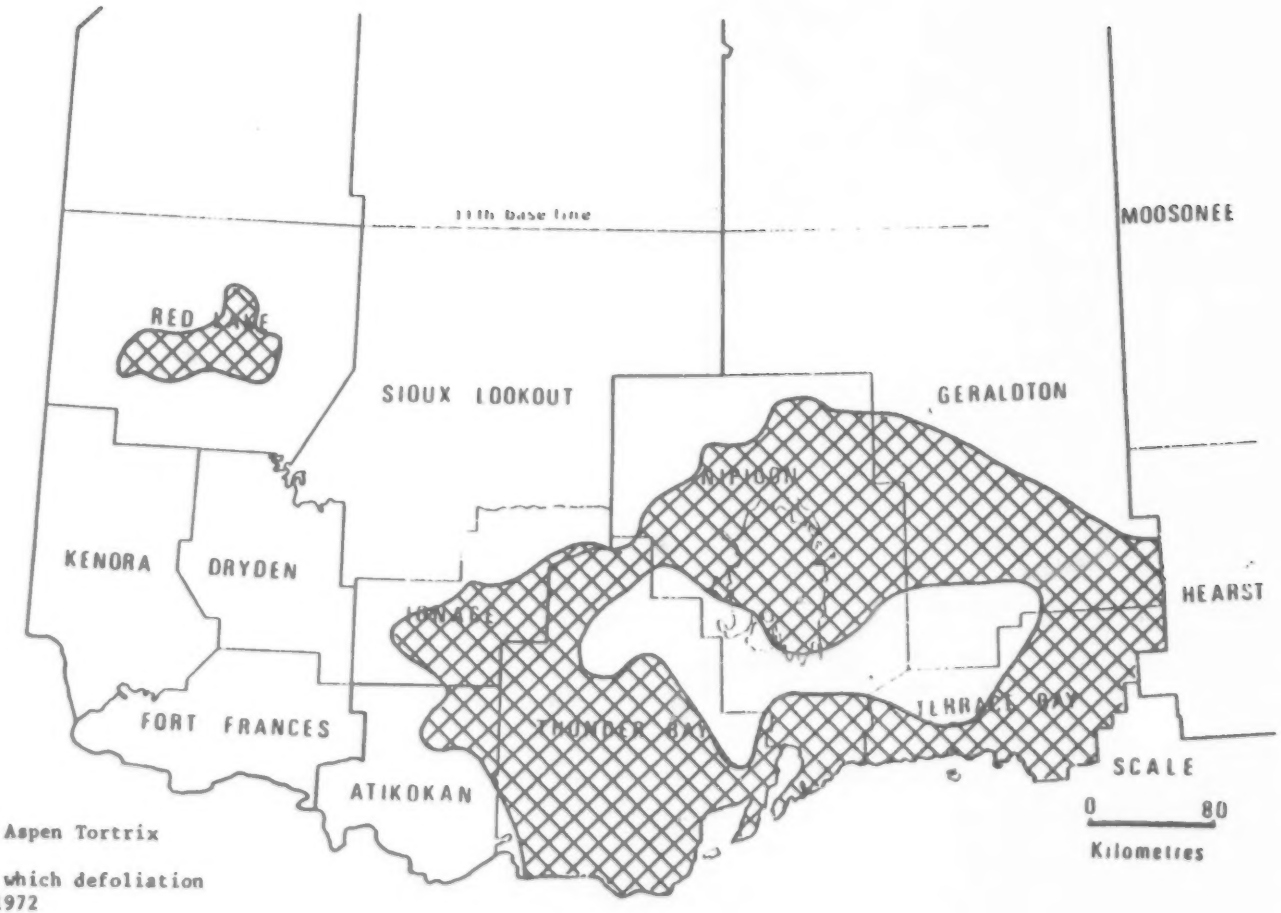
Large Aspen Tortrix

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



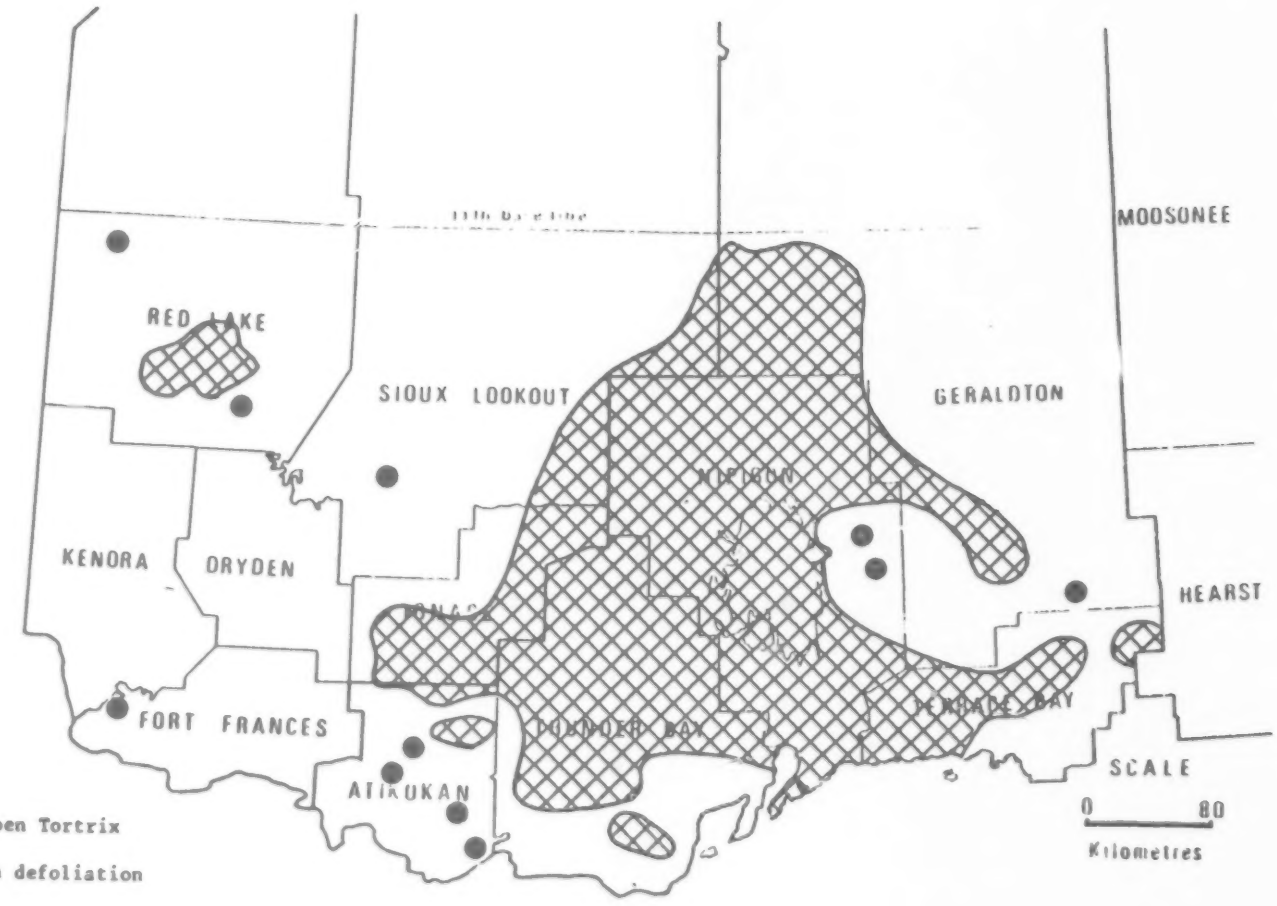
Large Aspen Tortrix

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



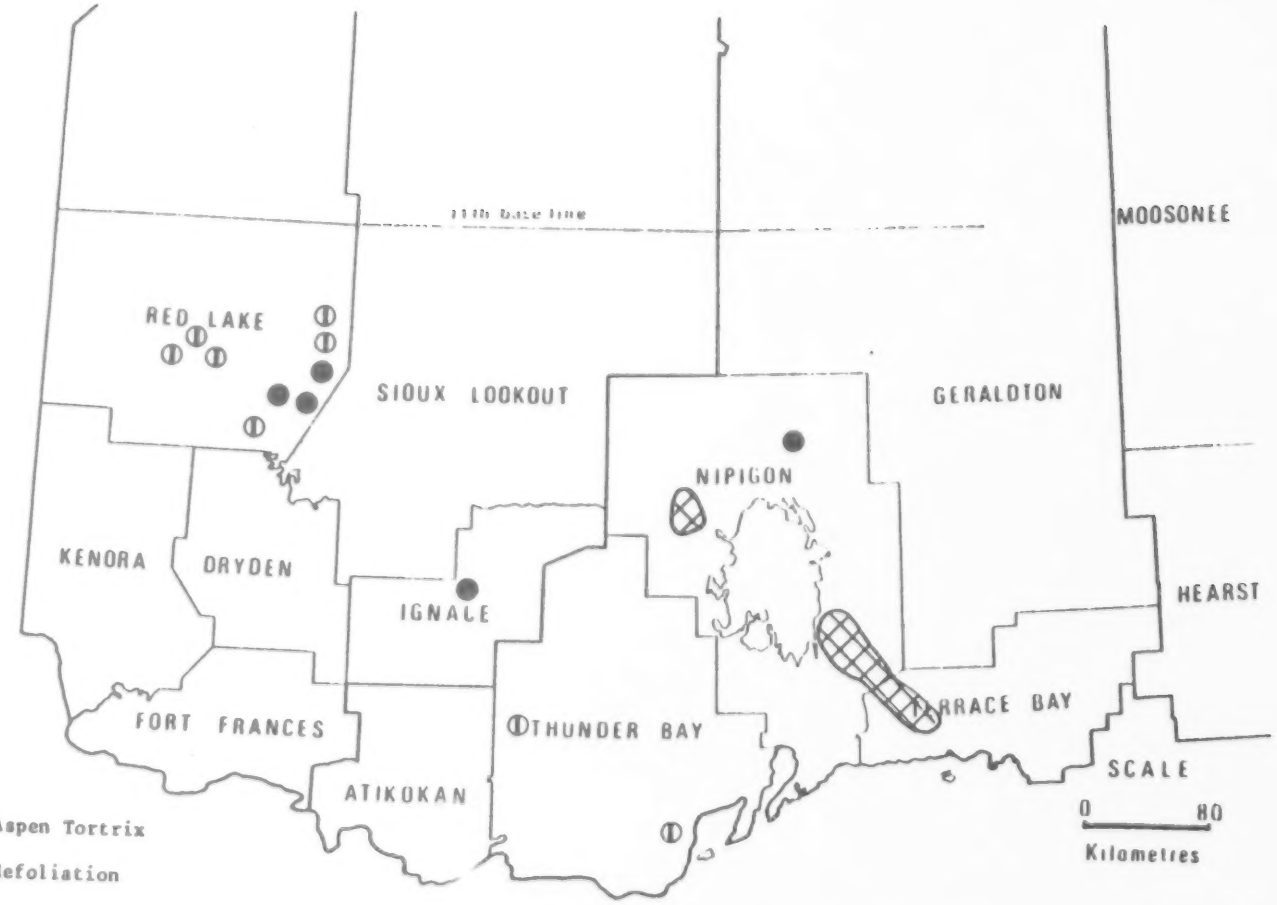
Large Aspen Tortrix

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

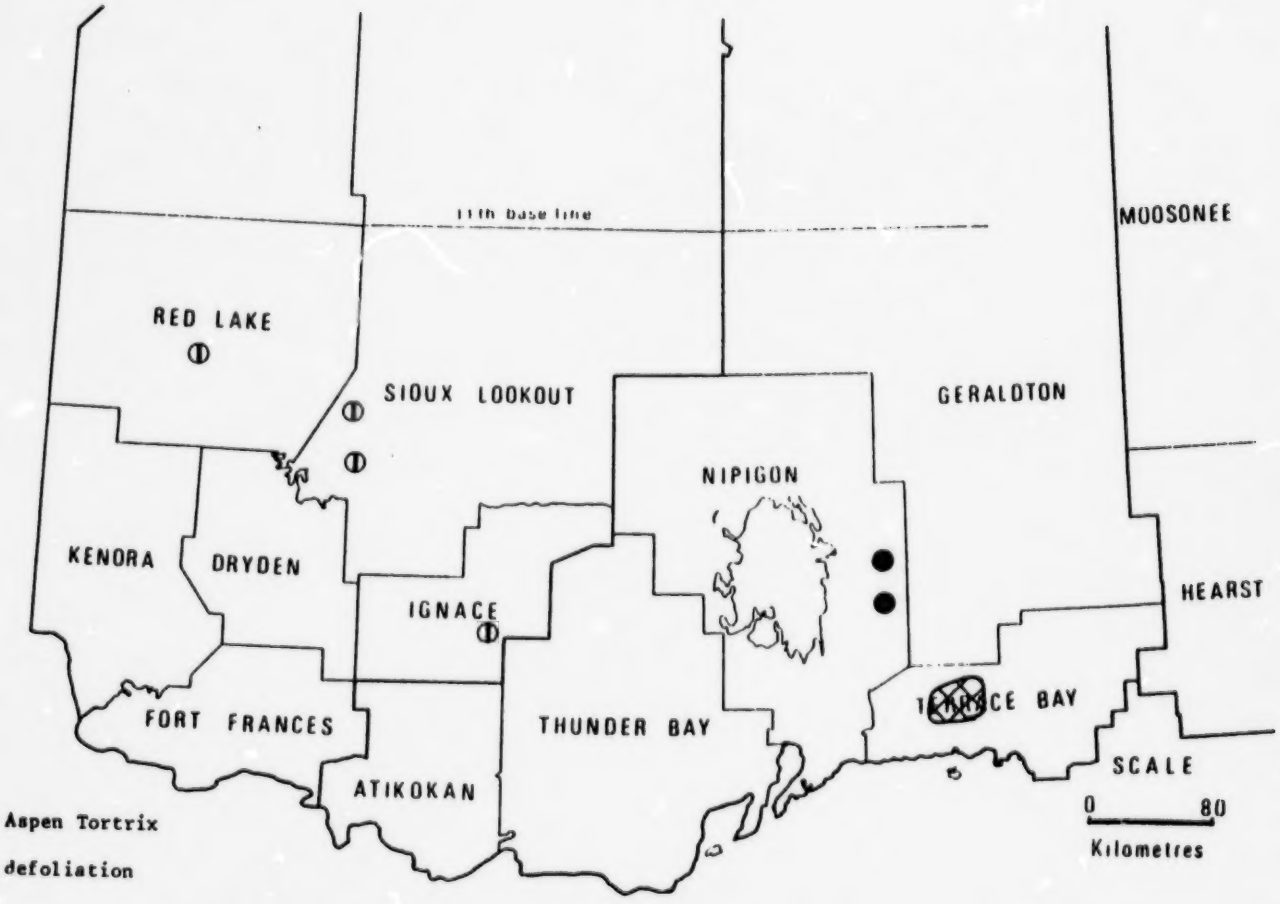
Areas within which defoliation occurred in 1974

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

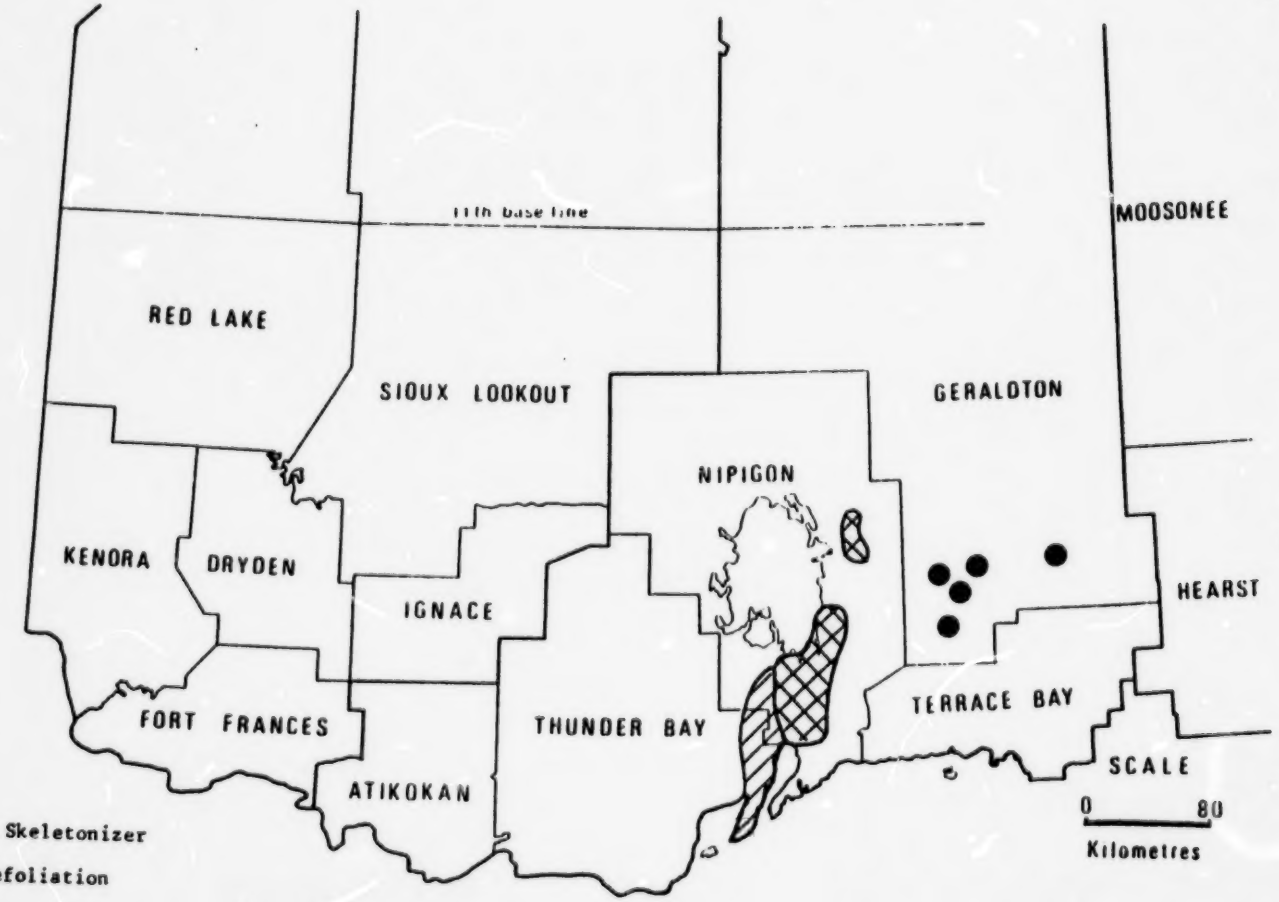
Areas within which defoliation occurred in 1975

LEGEND

Light defoliation ◑

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Birch Skeletonizer

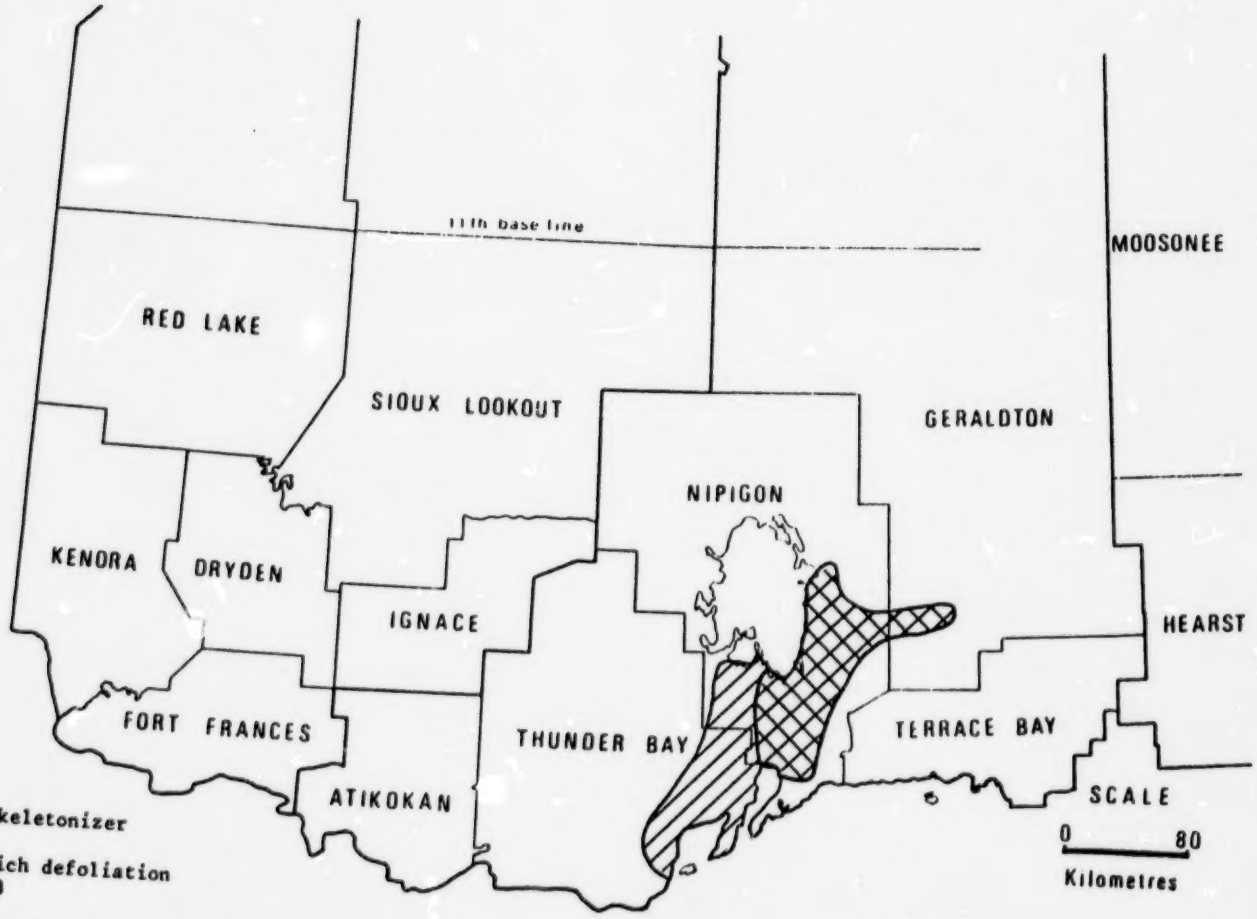
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Birch Skeletonizer

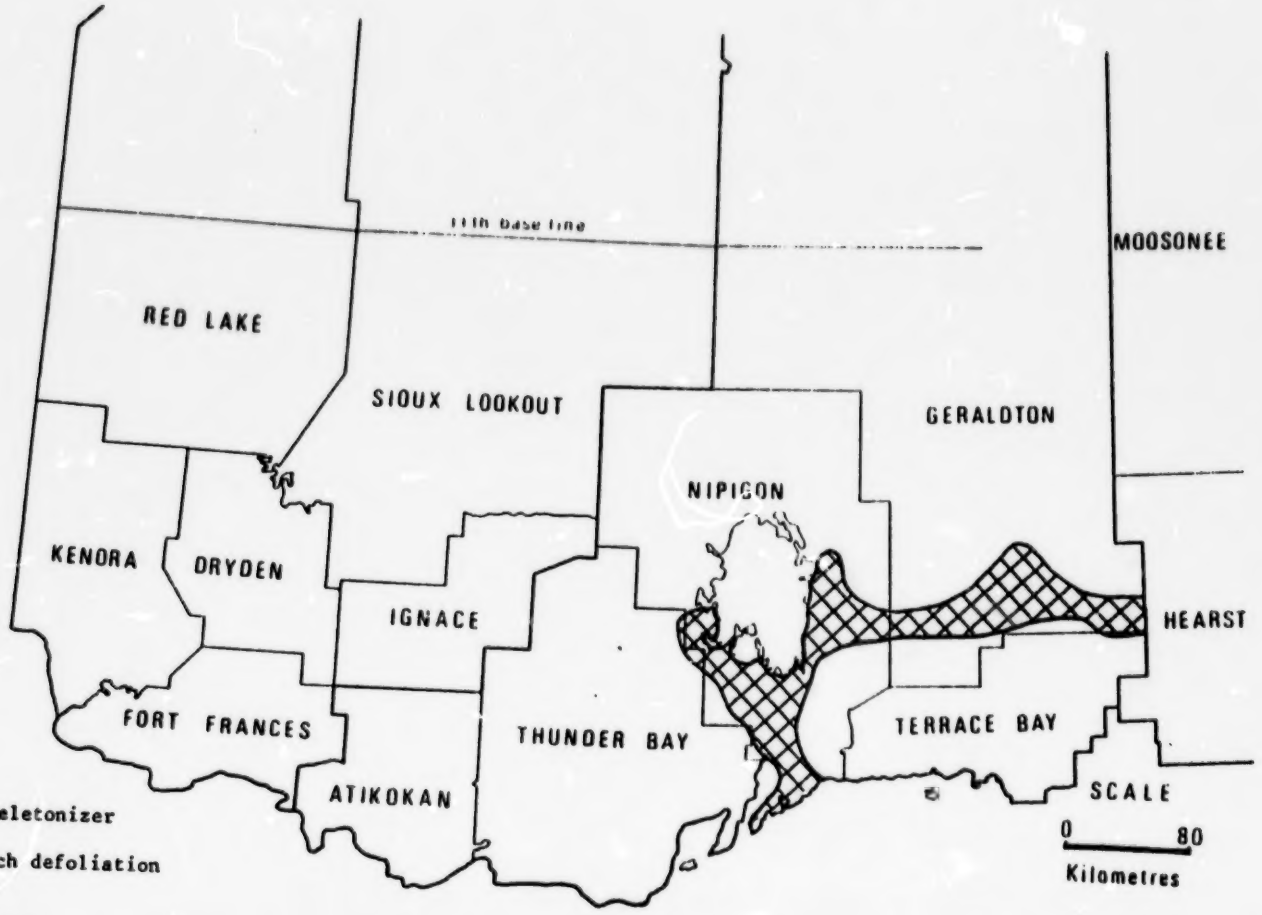
Areas within which defoliation occurred in 1963

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



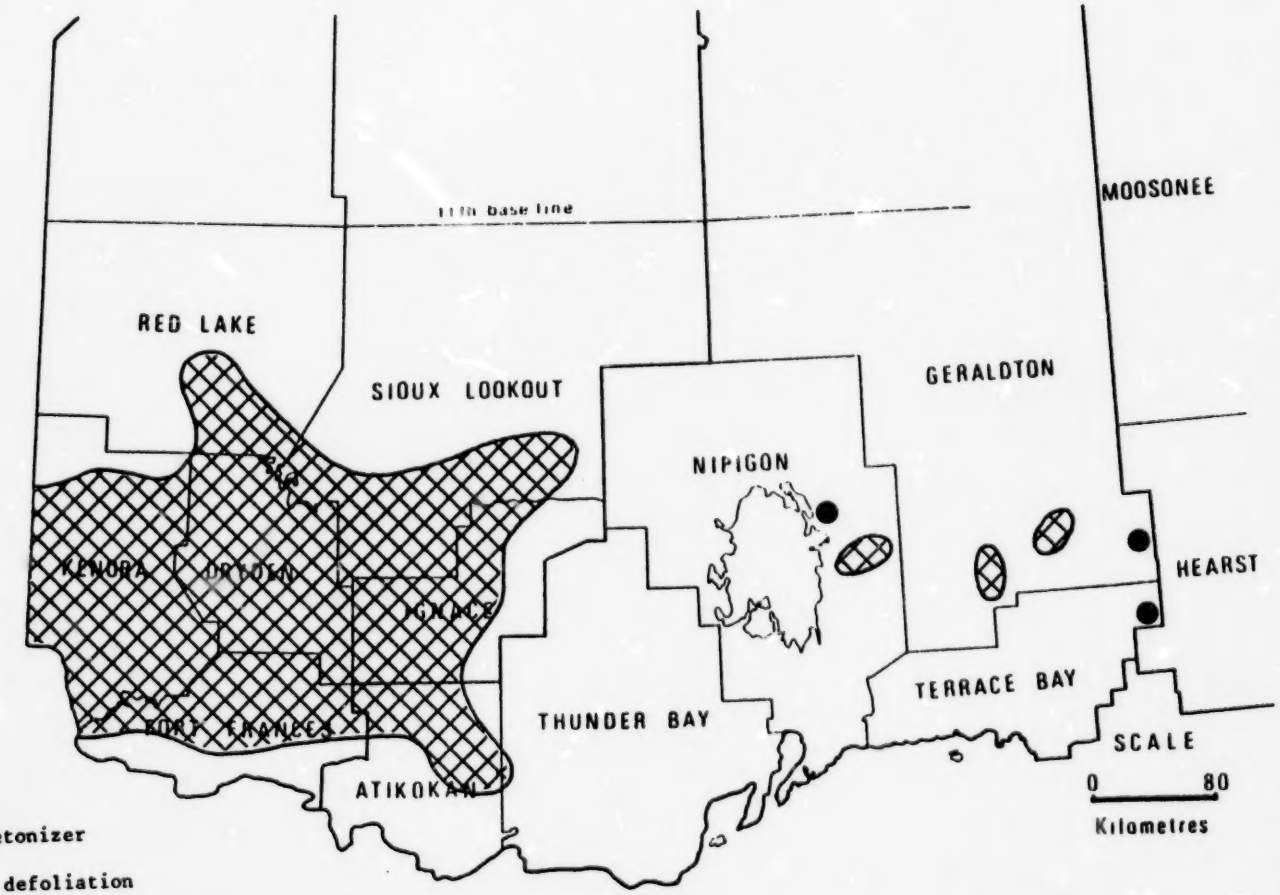
Birch Skeletonizer

Areas within which defoliation occurred in 1964

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



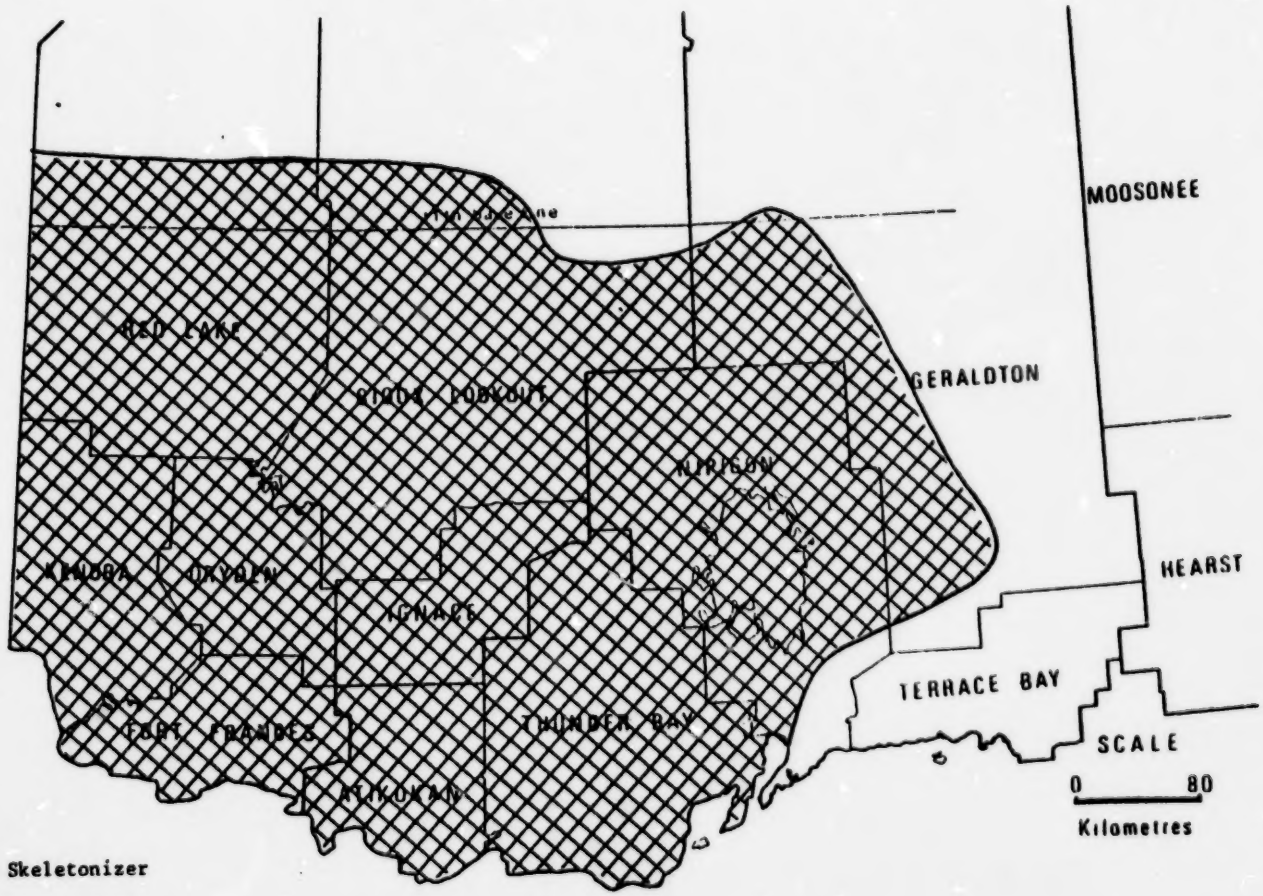
Birch Skeletonizer

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



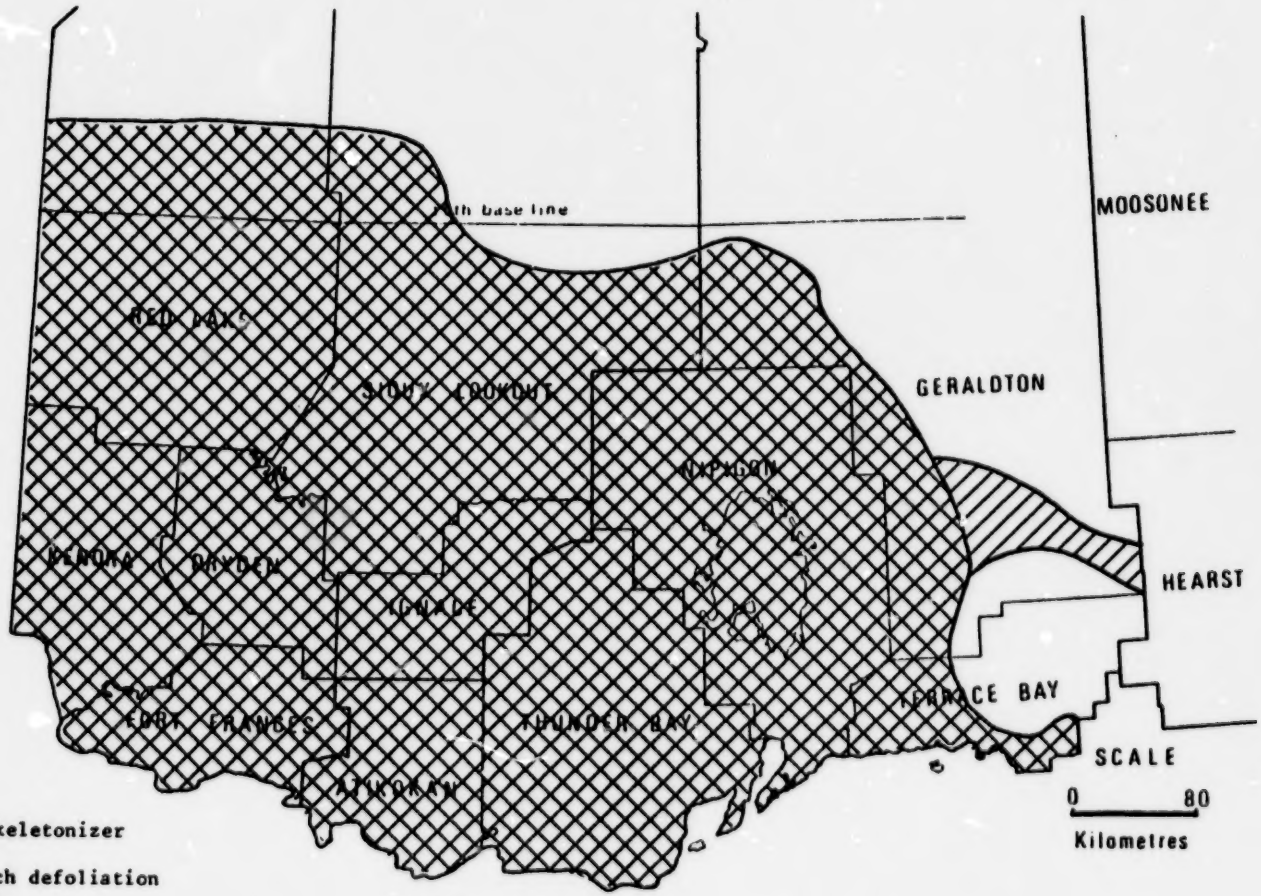
Birch Skeletonizer

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Birch Skeletonizer

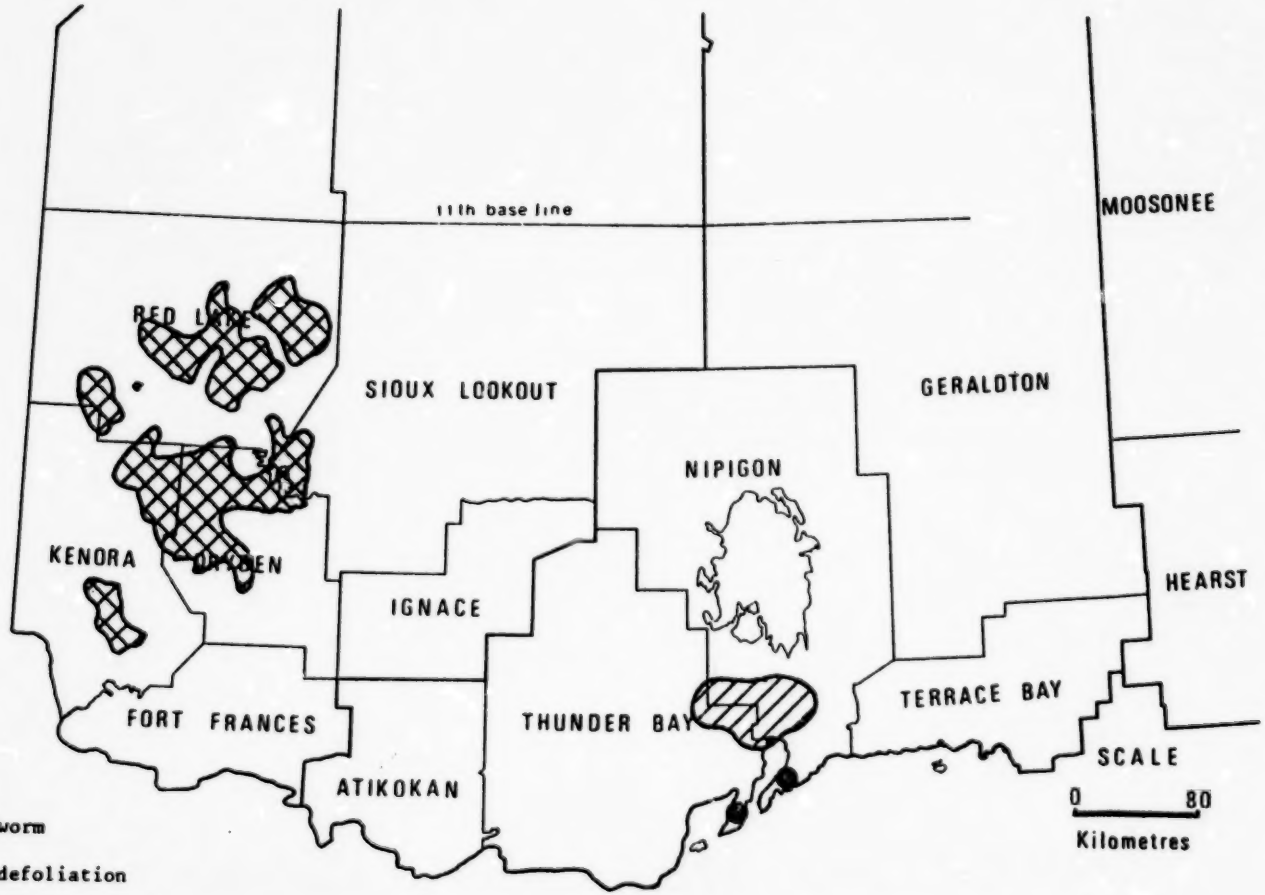
Areas within which defoliation occurred in 1973

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Spruce Budworm

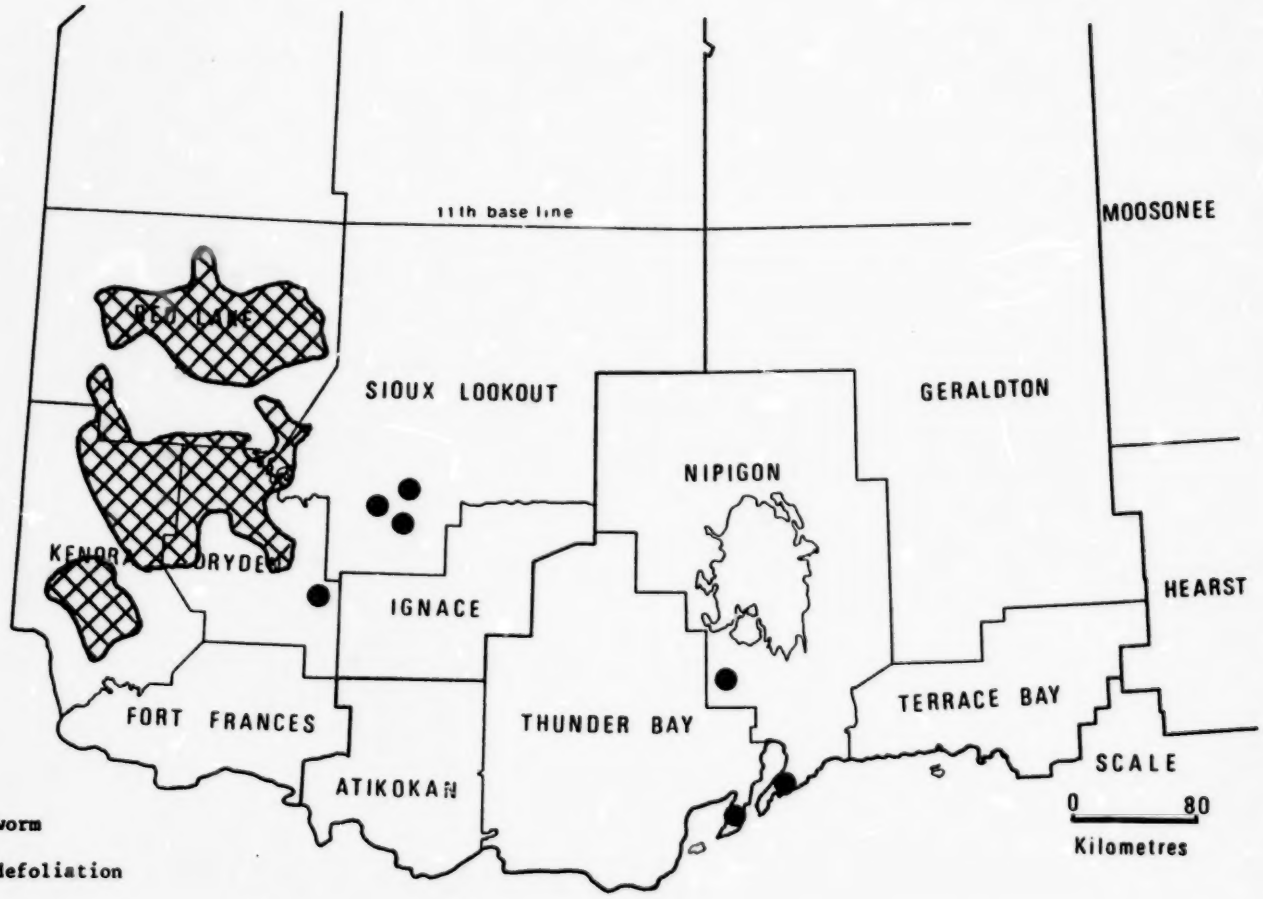
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



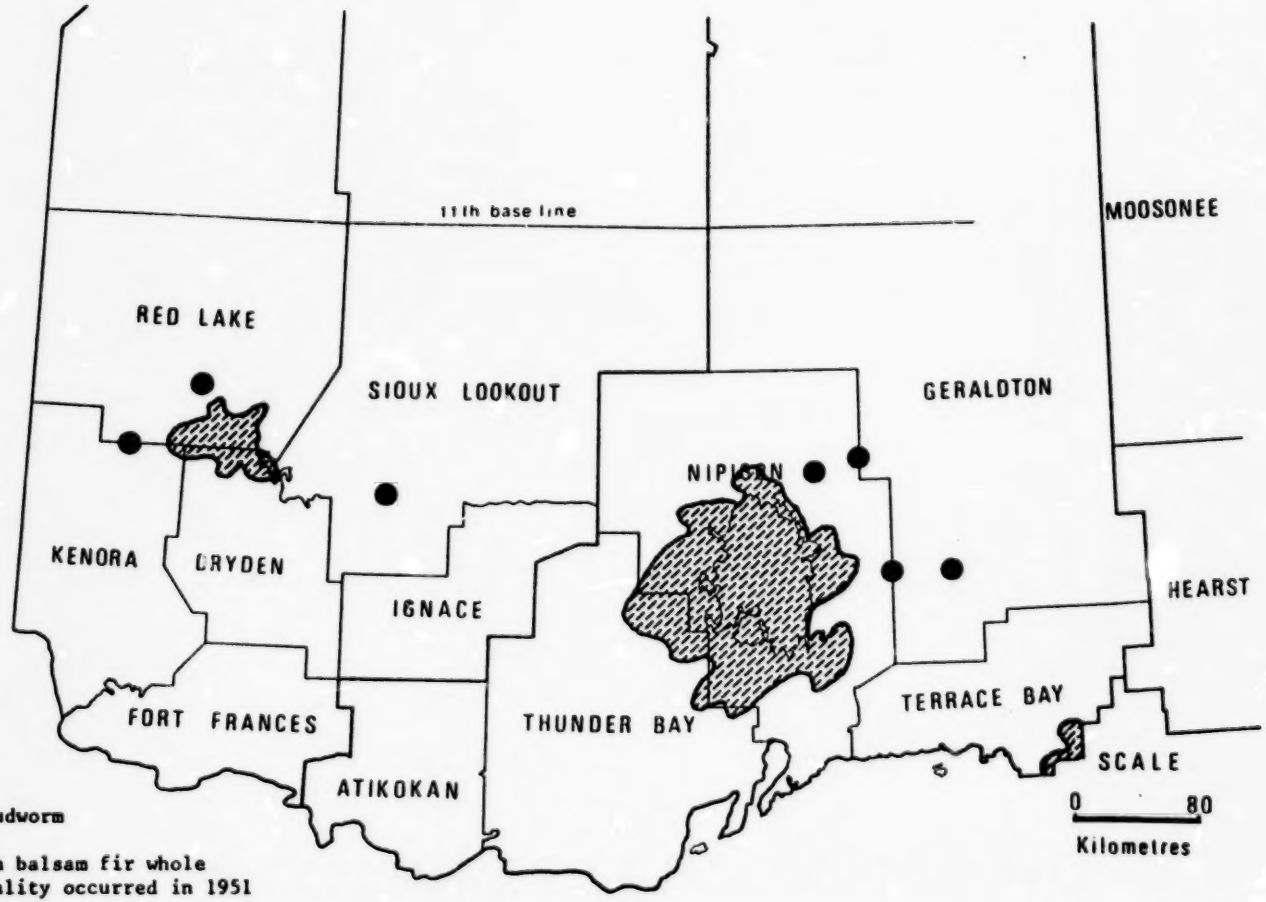
Spruce Budworm

Areas within which defoliation occurred in 1951

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



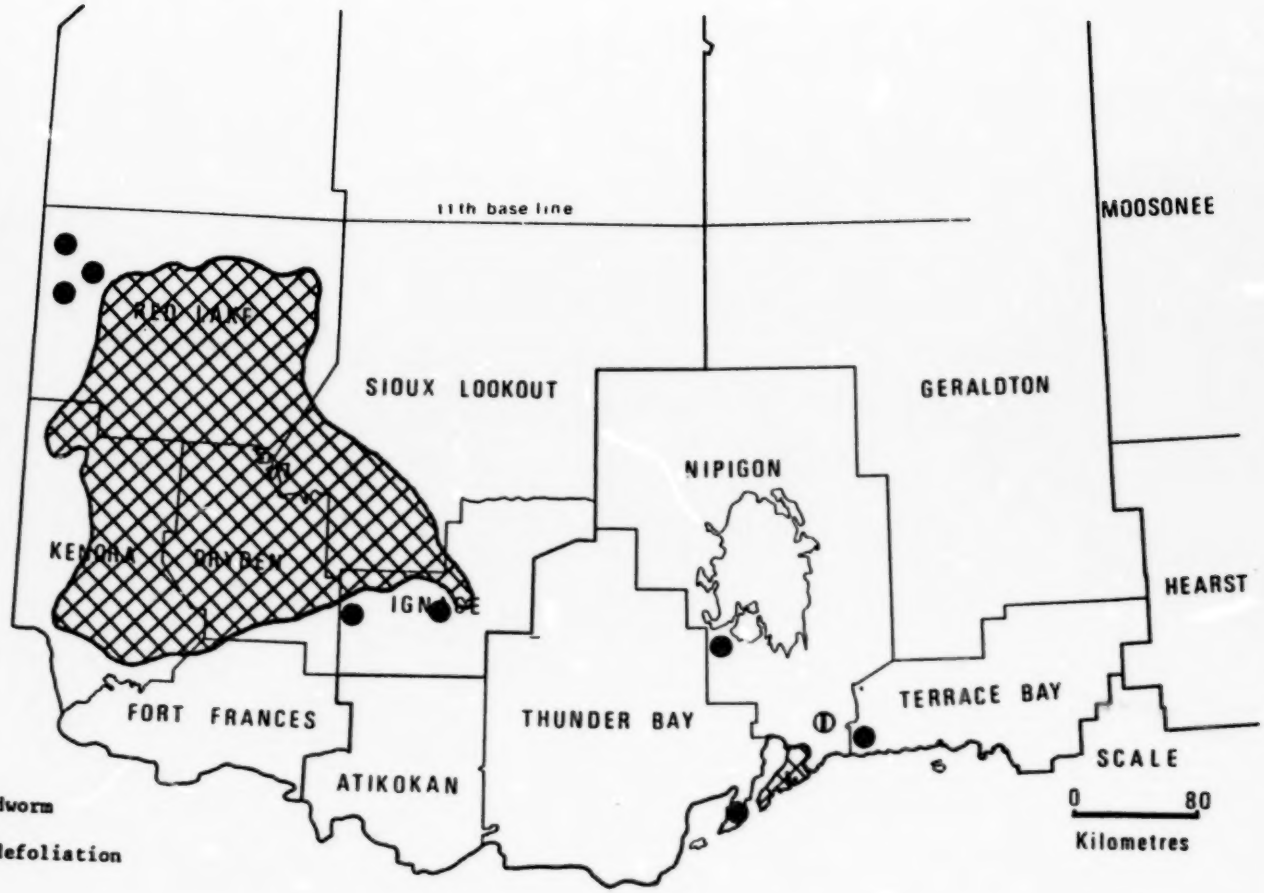
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1951

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

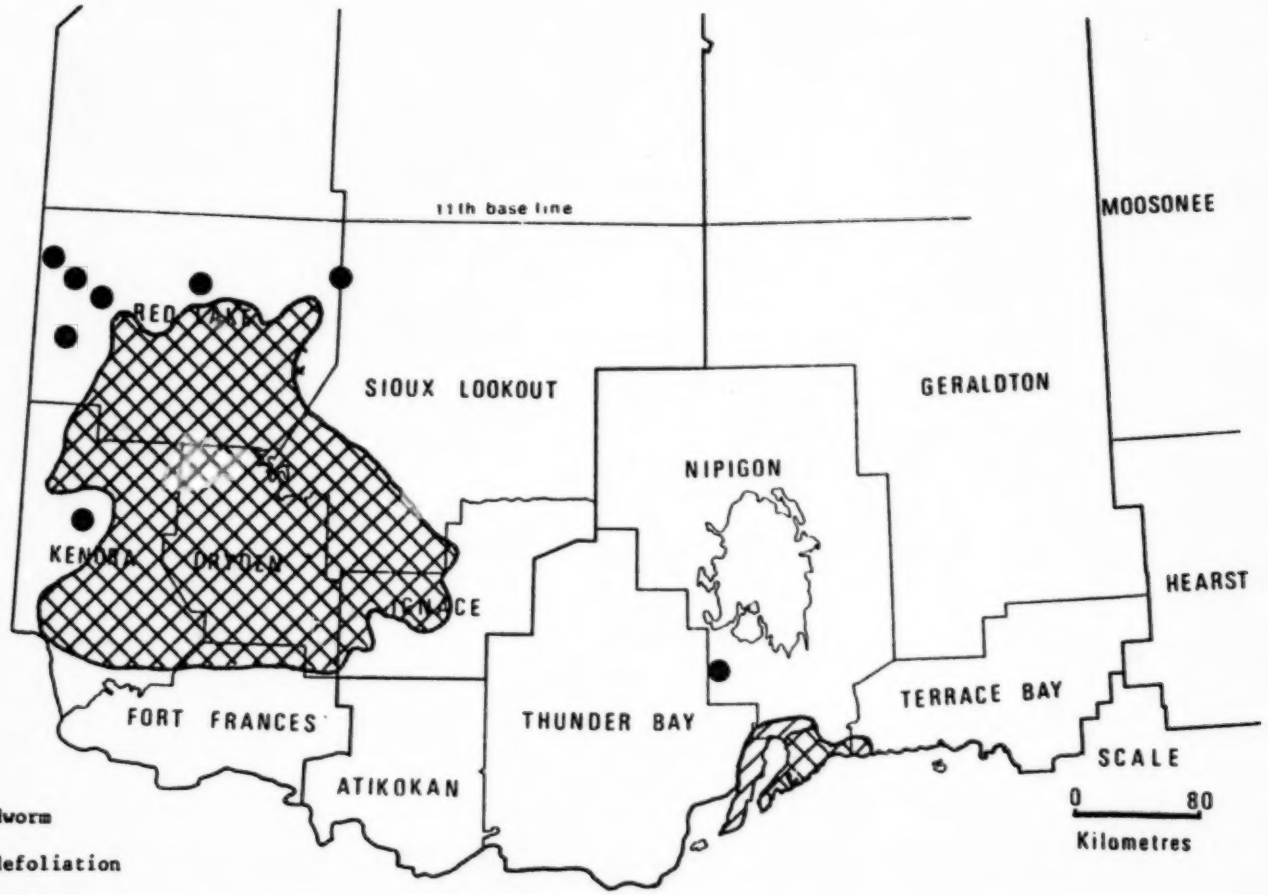
Areas within which defoliation occurred in 1952

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

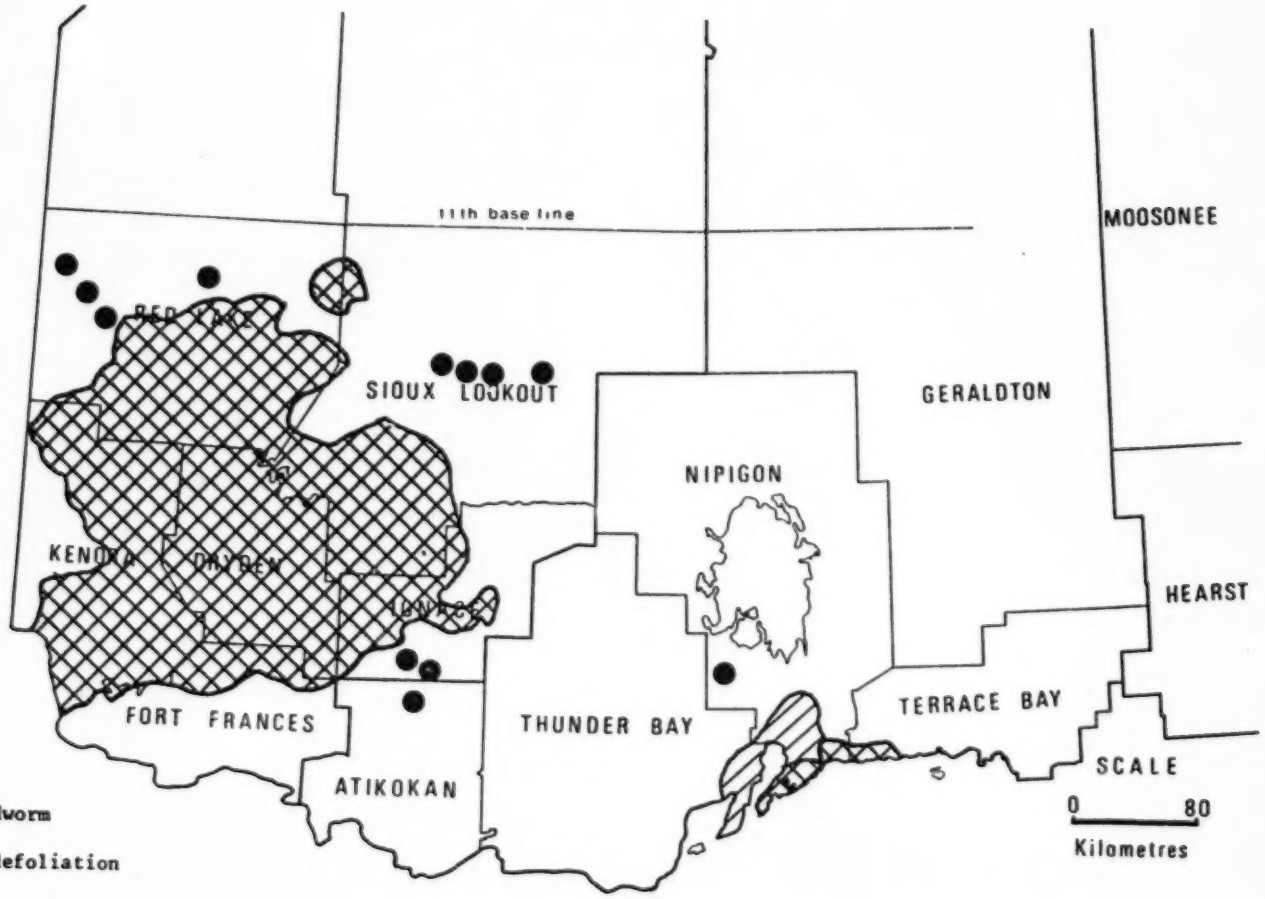
Areas within which defoliation occurred in 1953

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

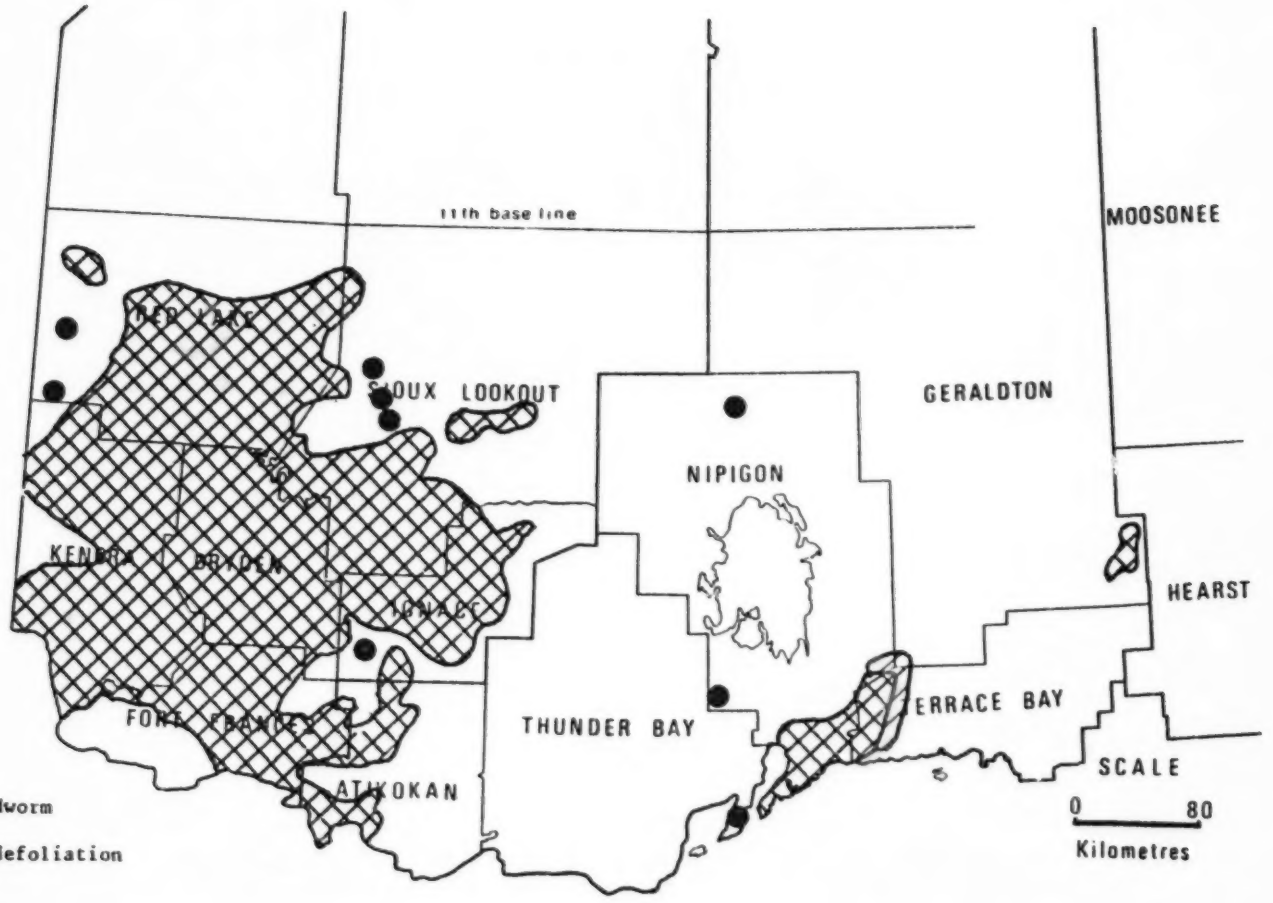
Areas within which defoliation occurred in 1954

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

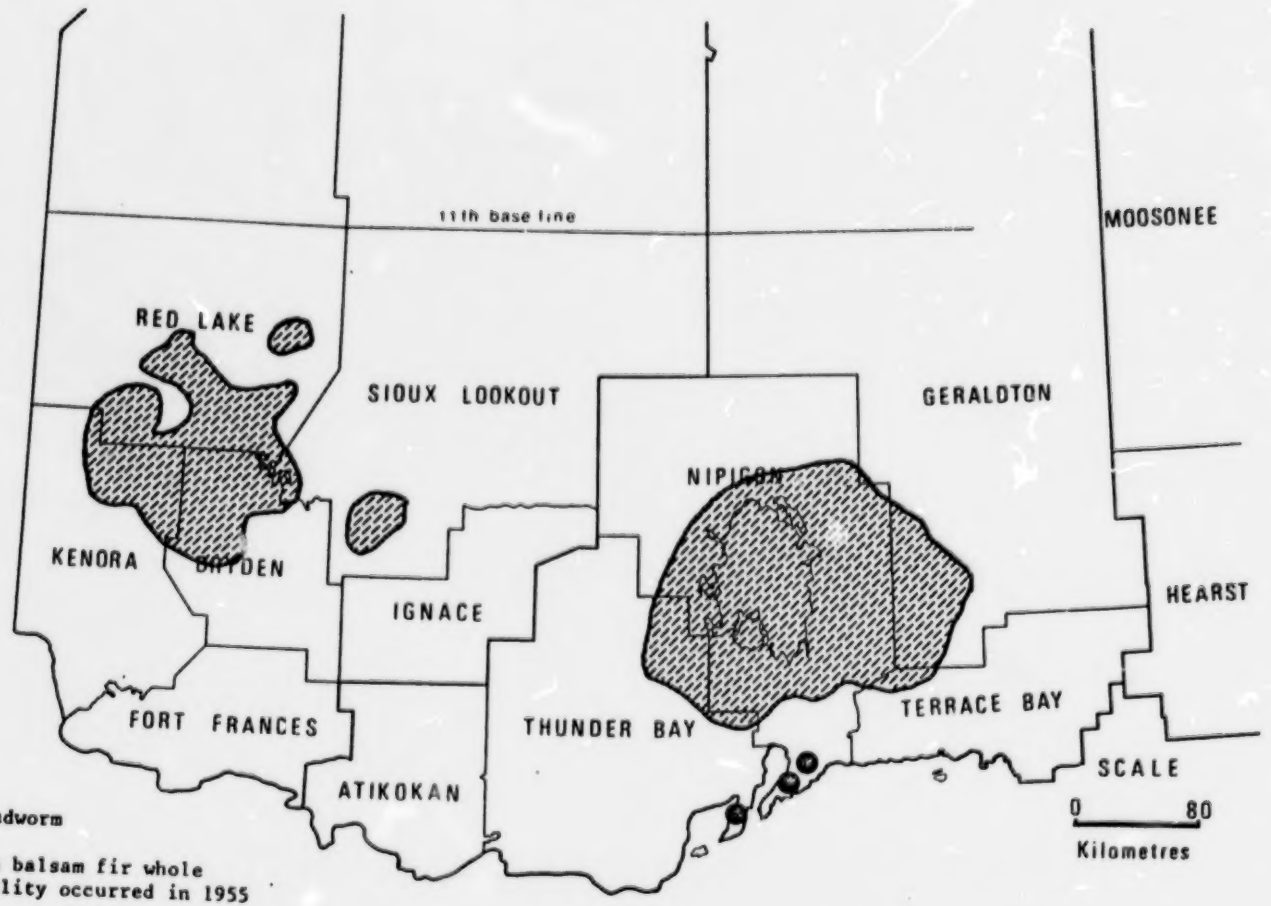
Areas within which defoliation occurred in 1955

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



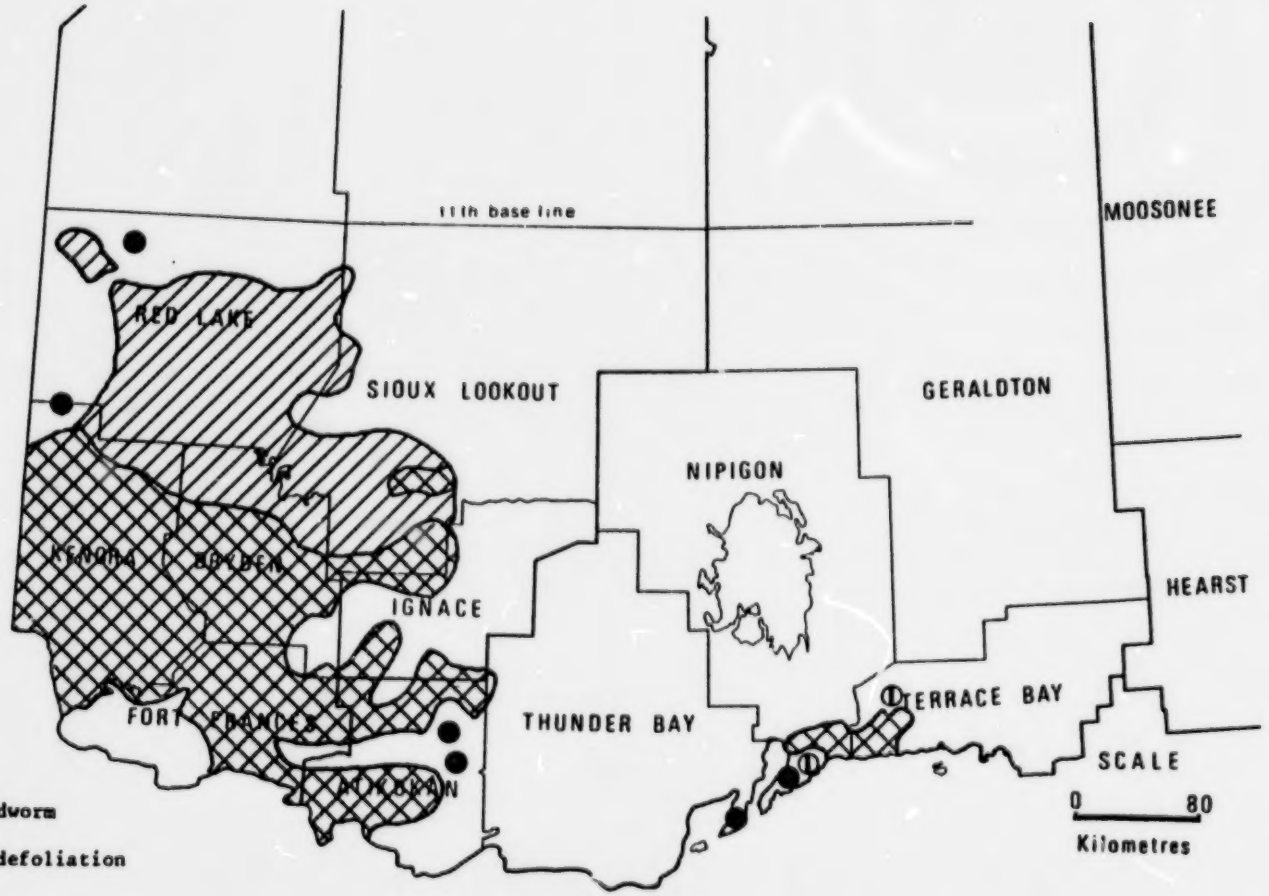
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1955

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

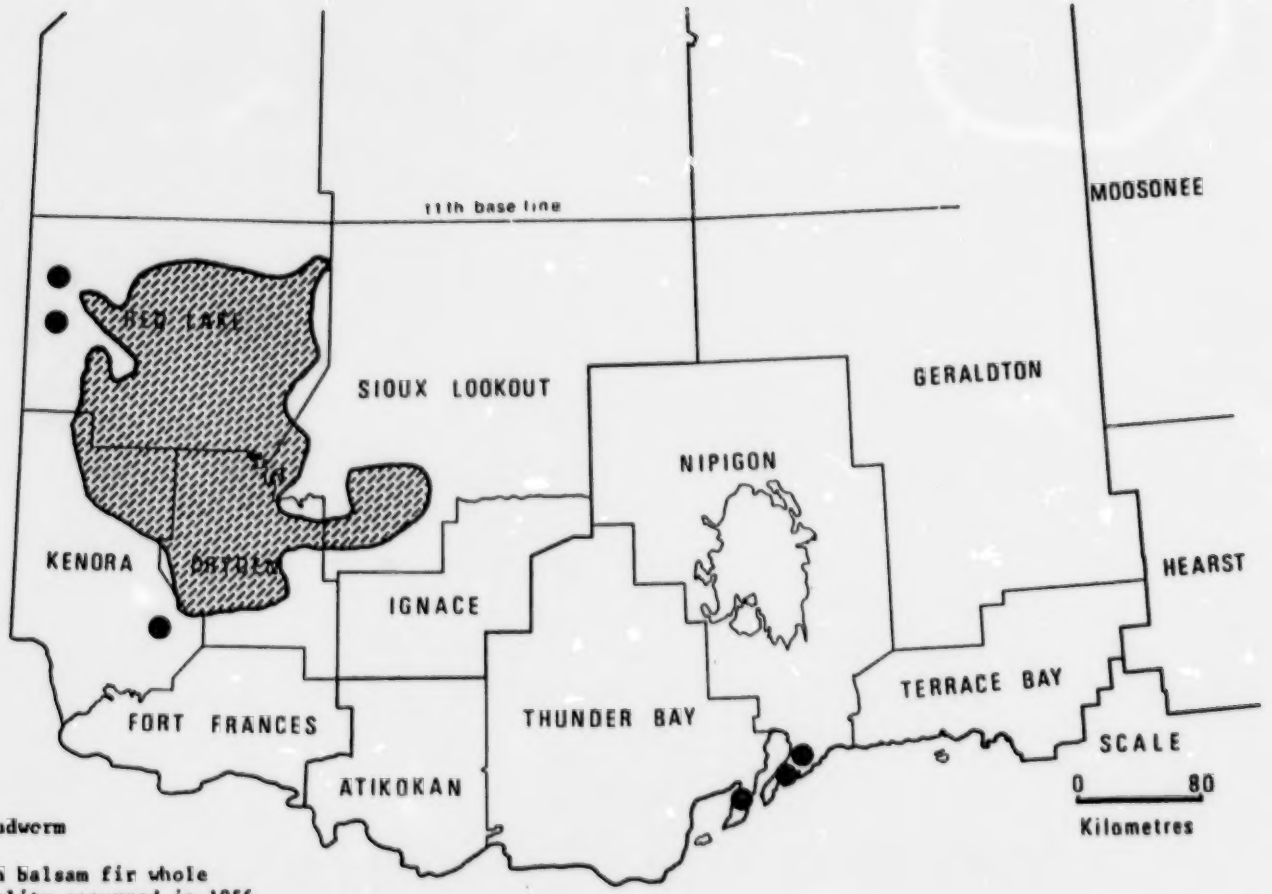
Areas within which defoliation occurred in 1956

LEGEND

Light defoliation ① or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



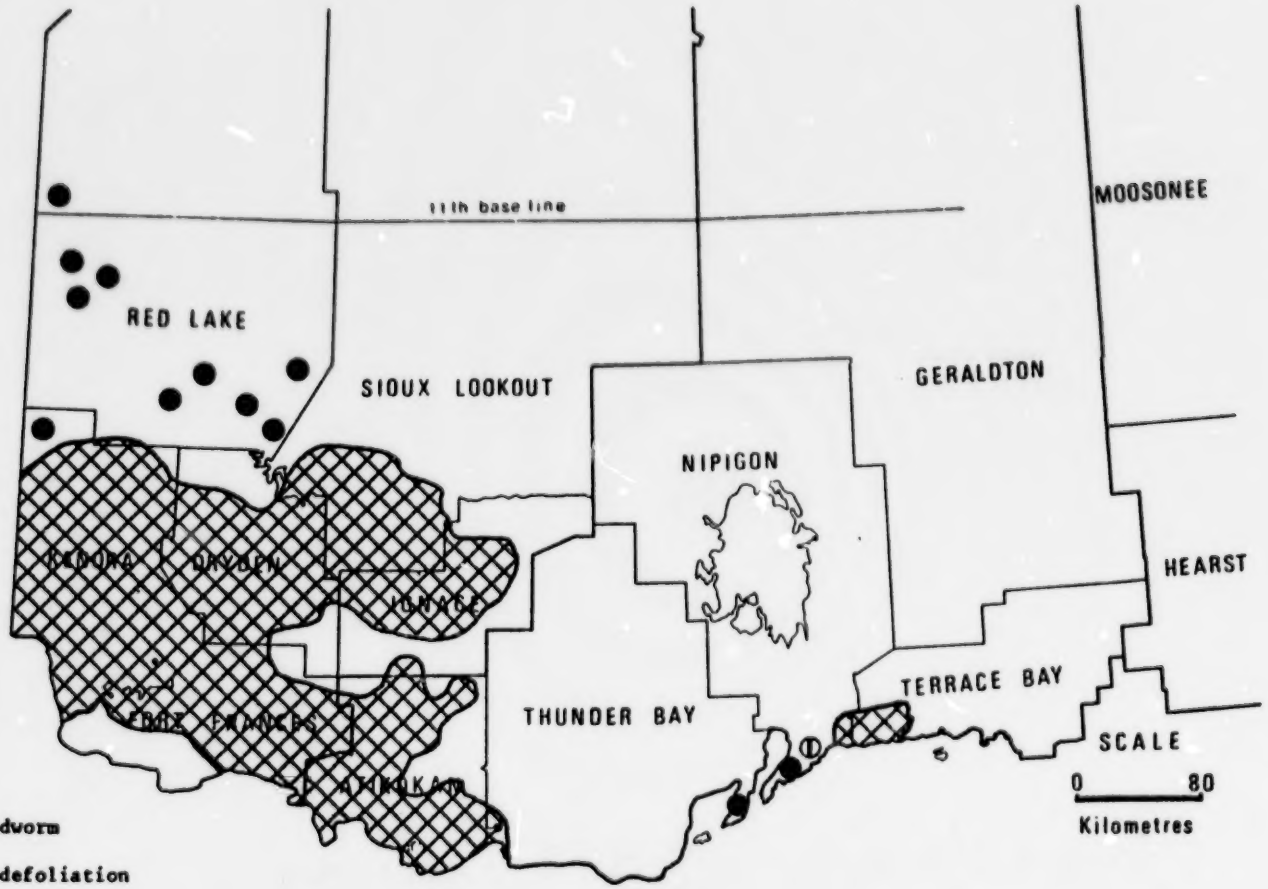
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1956

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

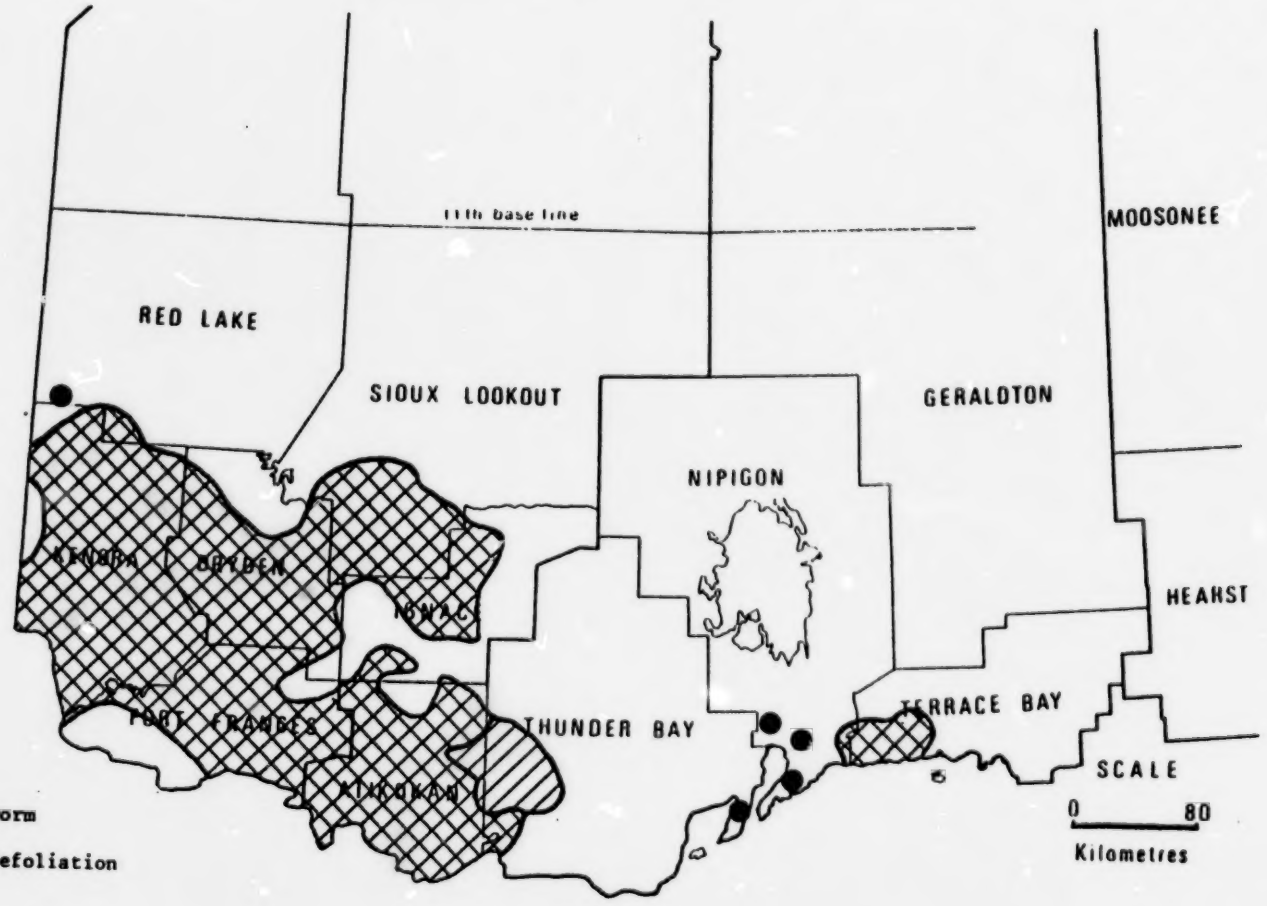
Areas within which defoliation occurred in 1957

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

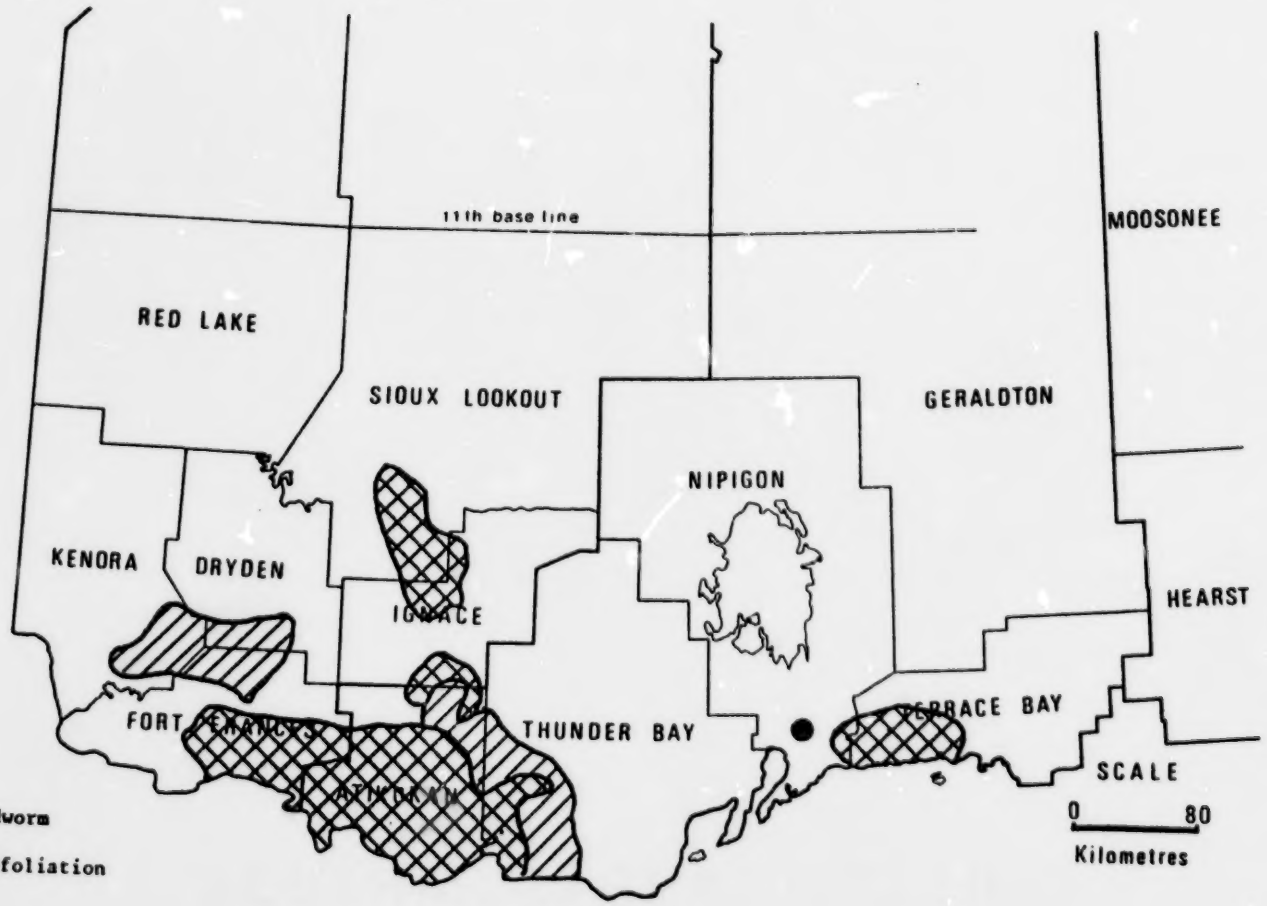
Areas within which defoliation occurred in 1958

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

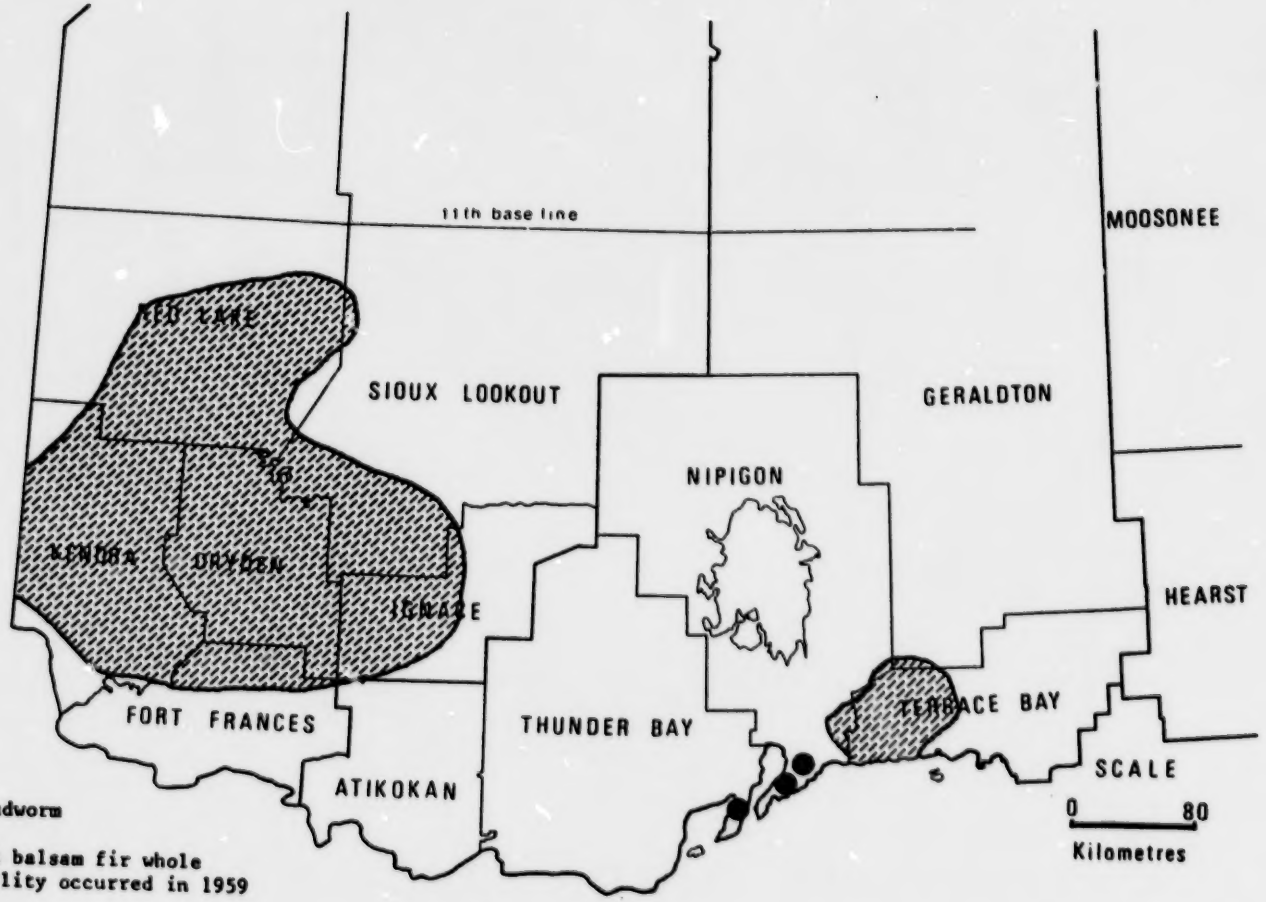
Areas with which defoliation occurred in 1959

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



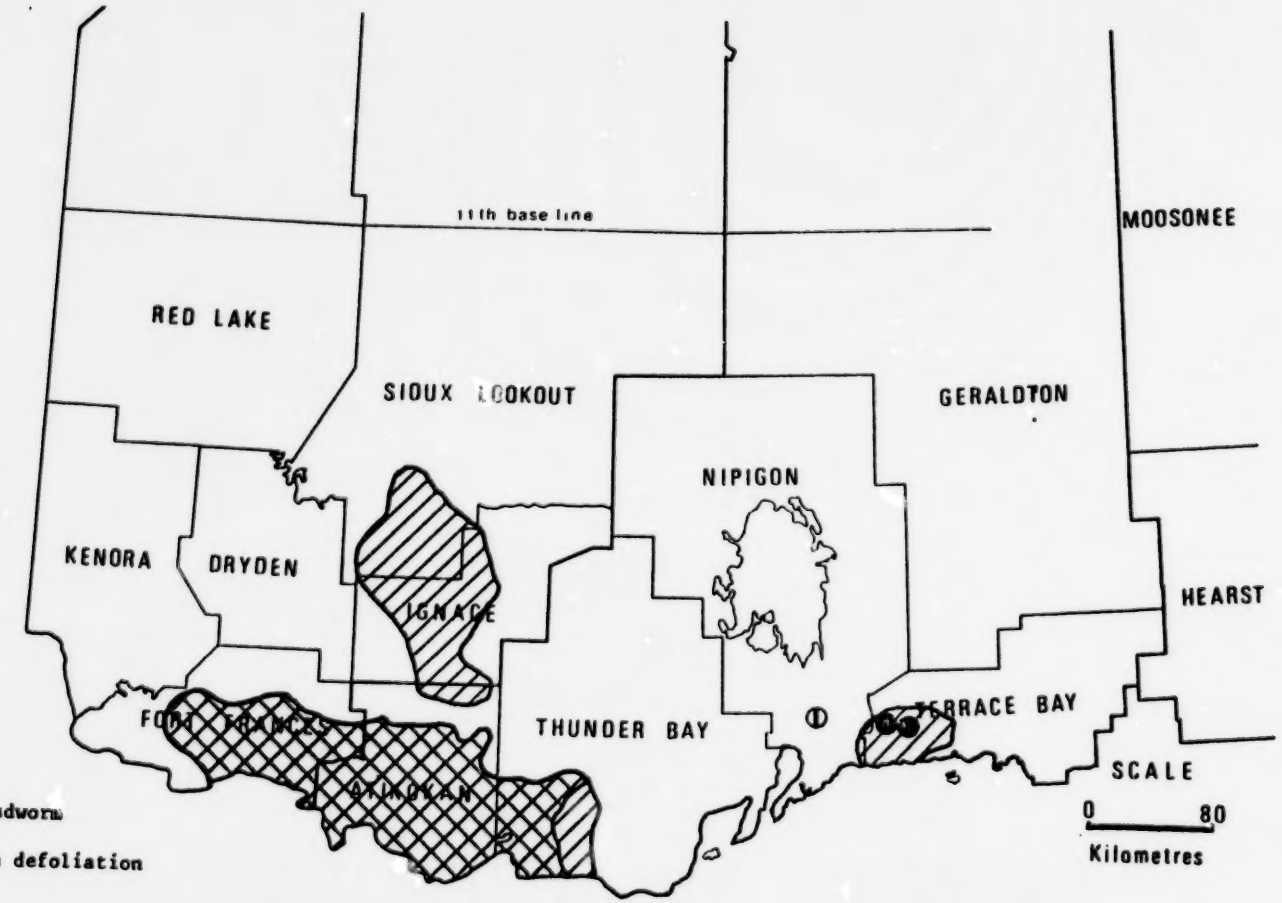
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1959

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

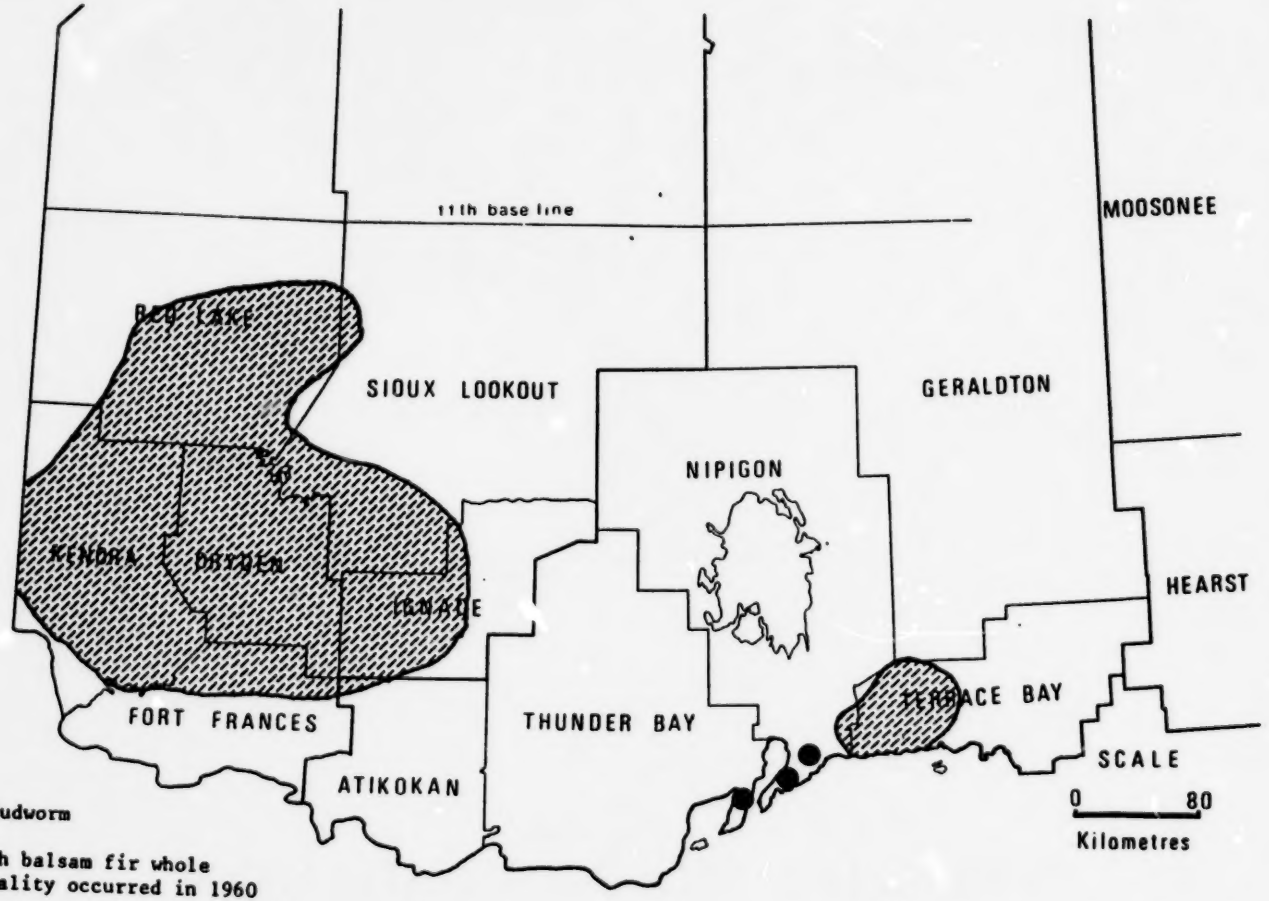
Areas within which defoliation occurred in 1960

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



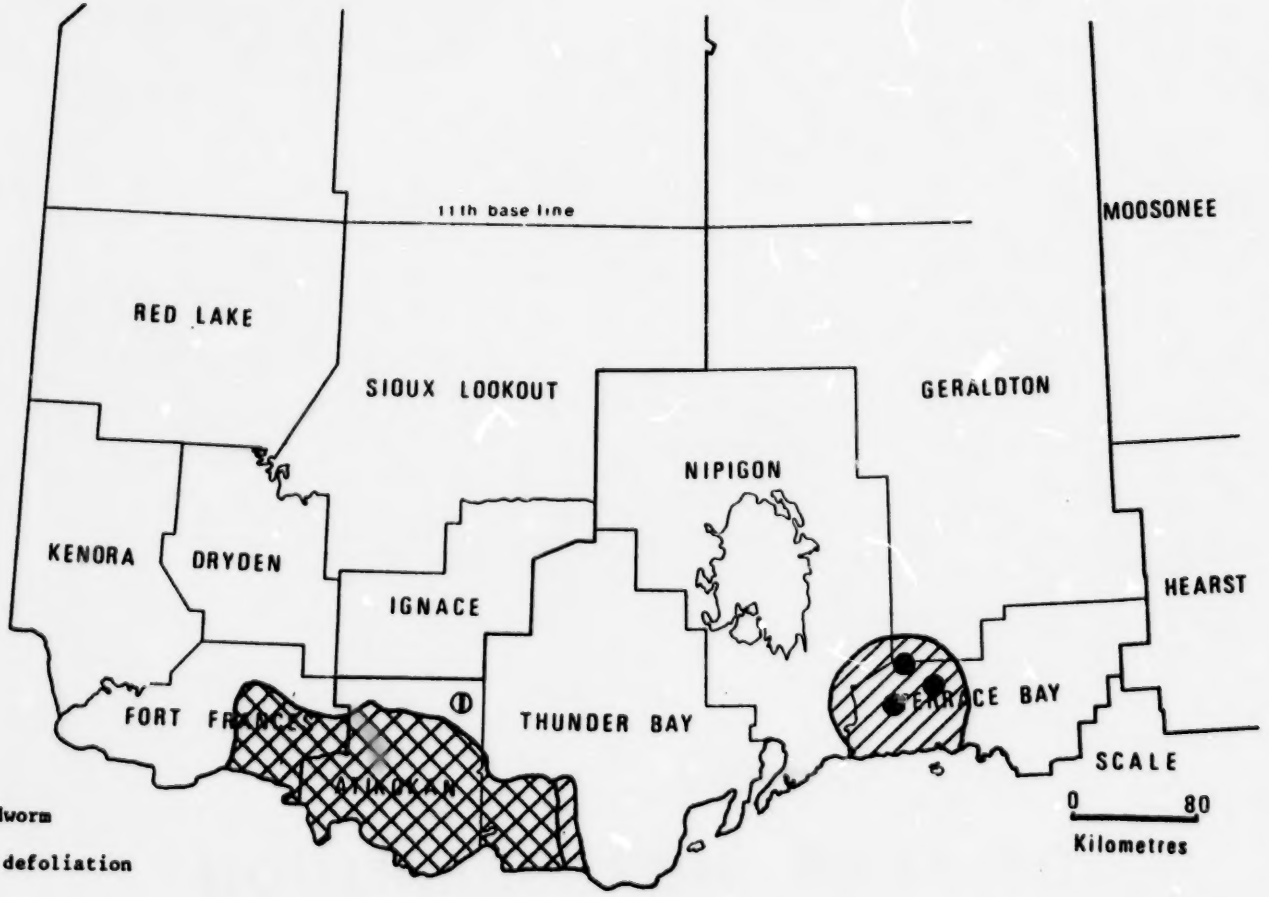
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1960

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

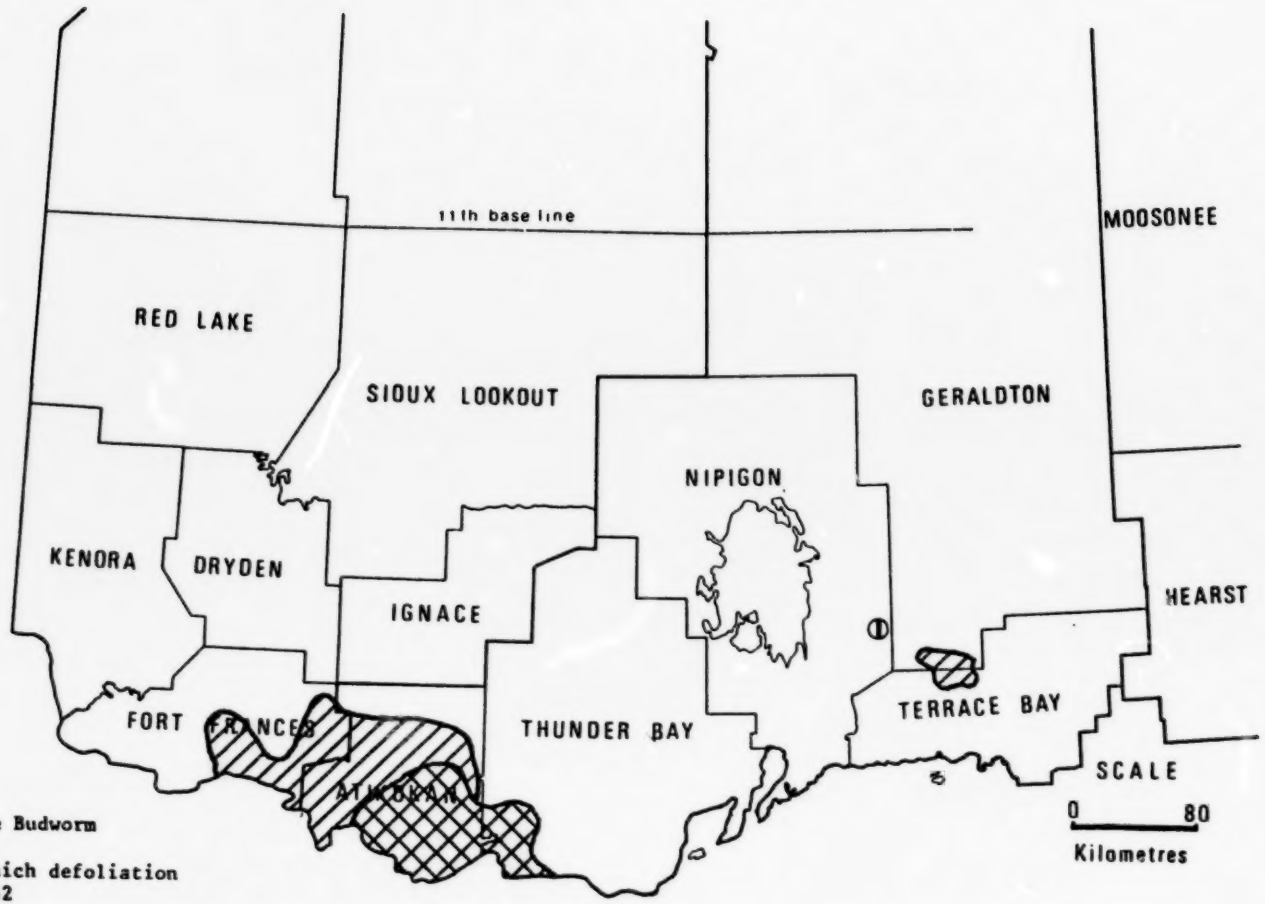
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



Spruce Budworm

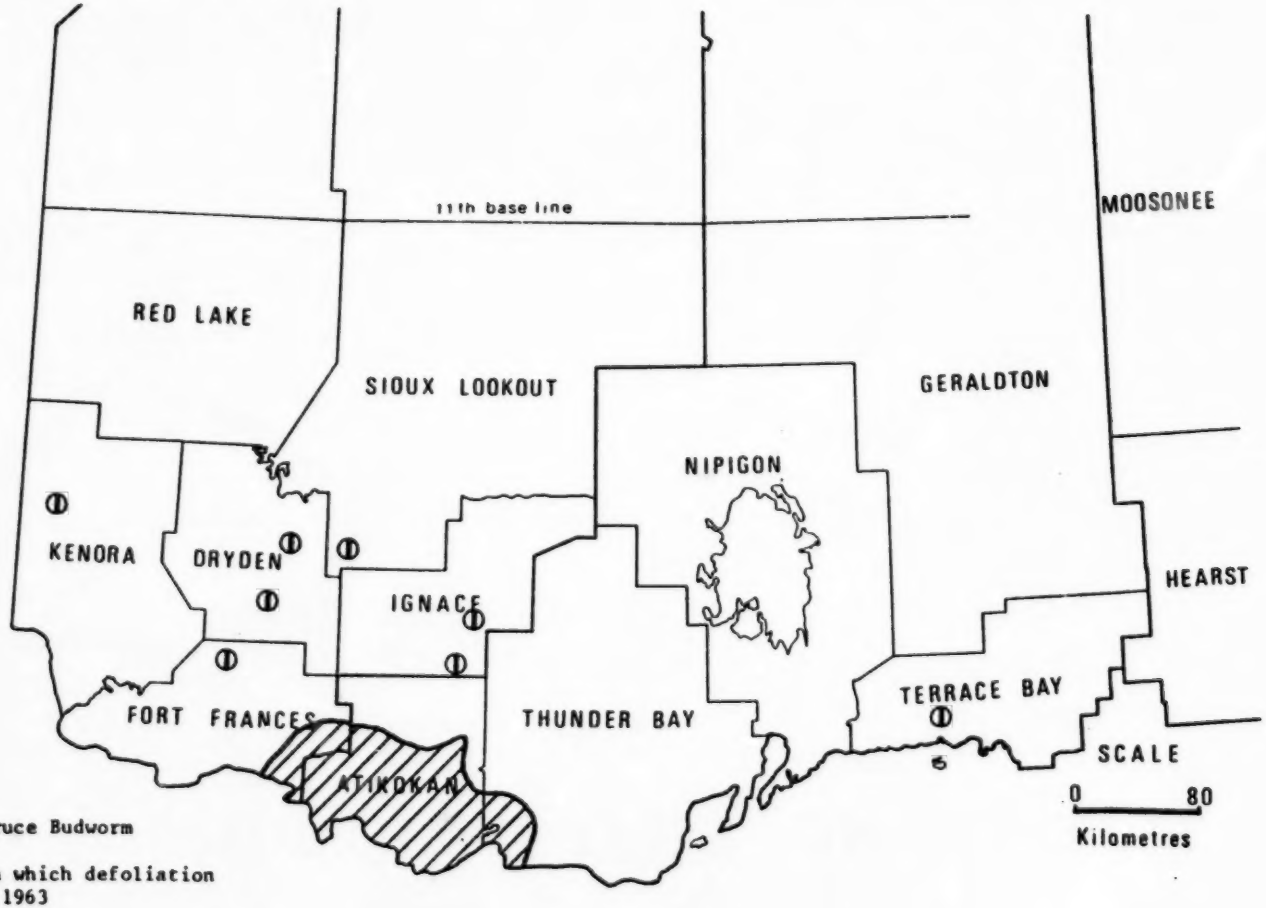
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ① or ▨

Moderate-to-severe defoliation ▩

NORTHWESTERN ONTARIO



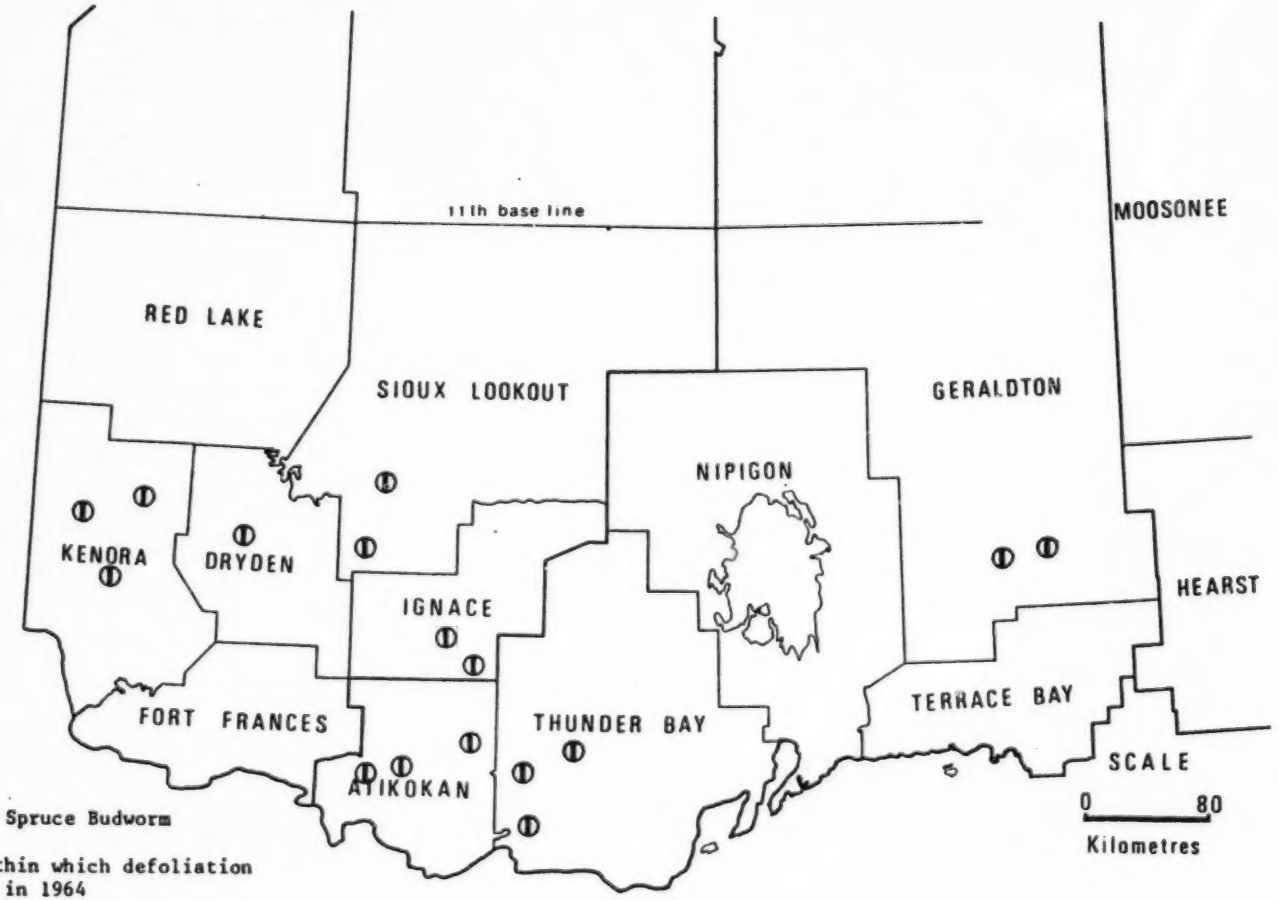
Spruce Budworm

Areas within which defoliation occurred in 1963

LEGEND

Light defoliation ① or ▨

NORTHWESTERN ONTARIO



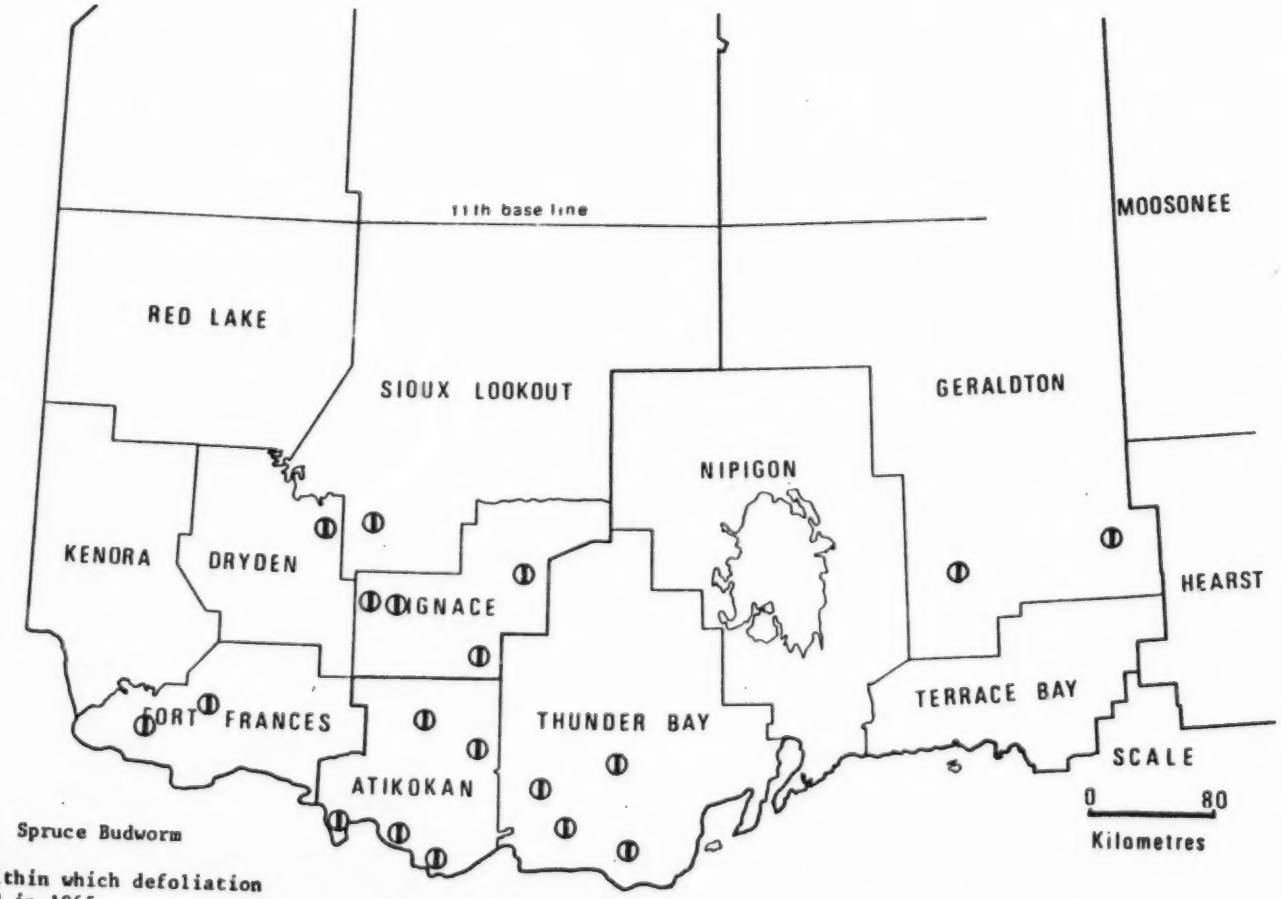
Spruce Budworm

Areas within which defoliation occurred in 1964

LEGEND

Light defoliation

NORTHWESTERN ONTARIO



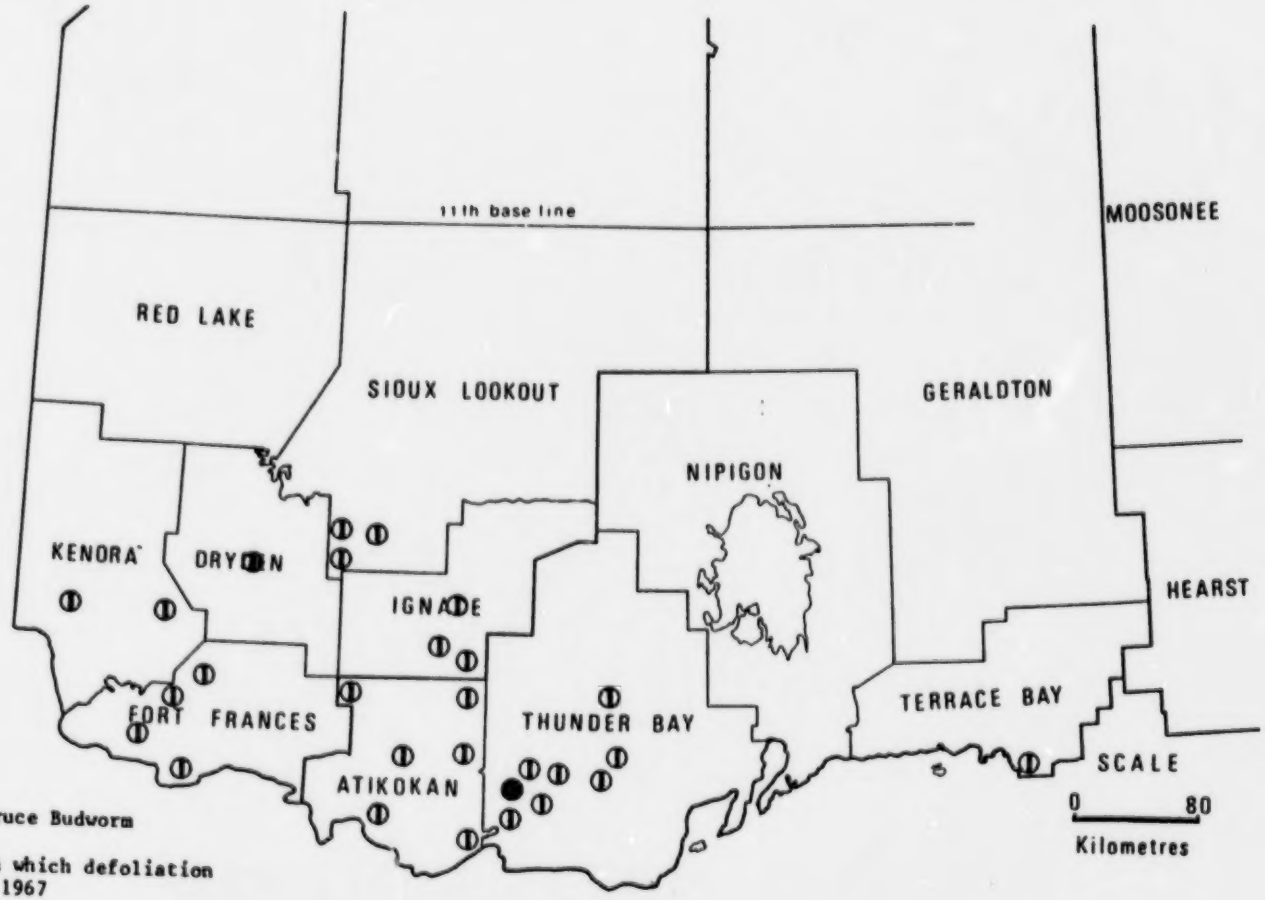
Spruce Budworm

Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ◐

NORTHWESTERN ONTARIO



Spruce Budworm

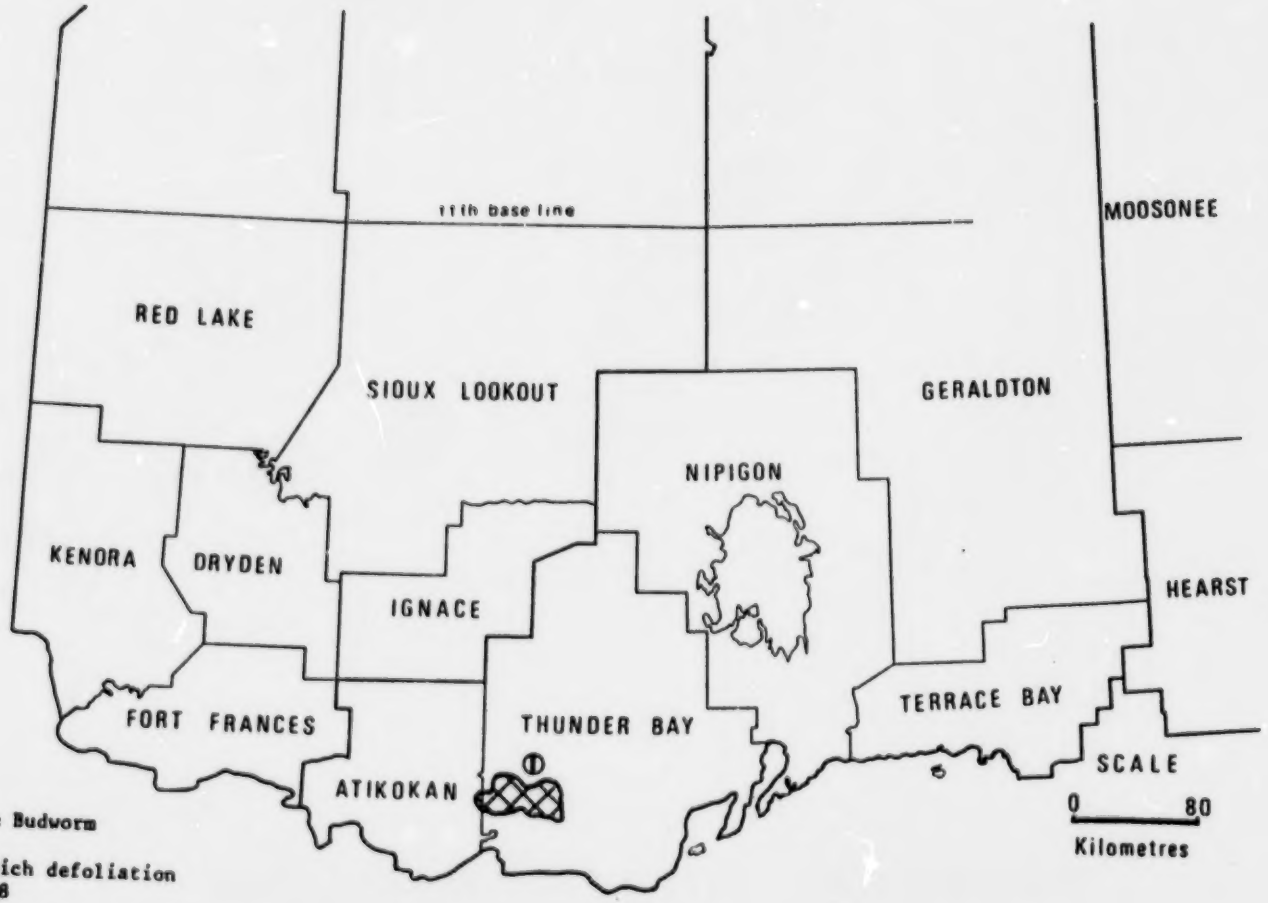
Areas within which defoliation occurred in 1967

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spruce Budworm

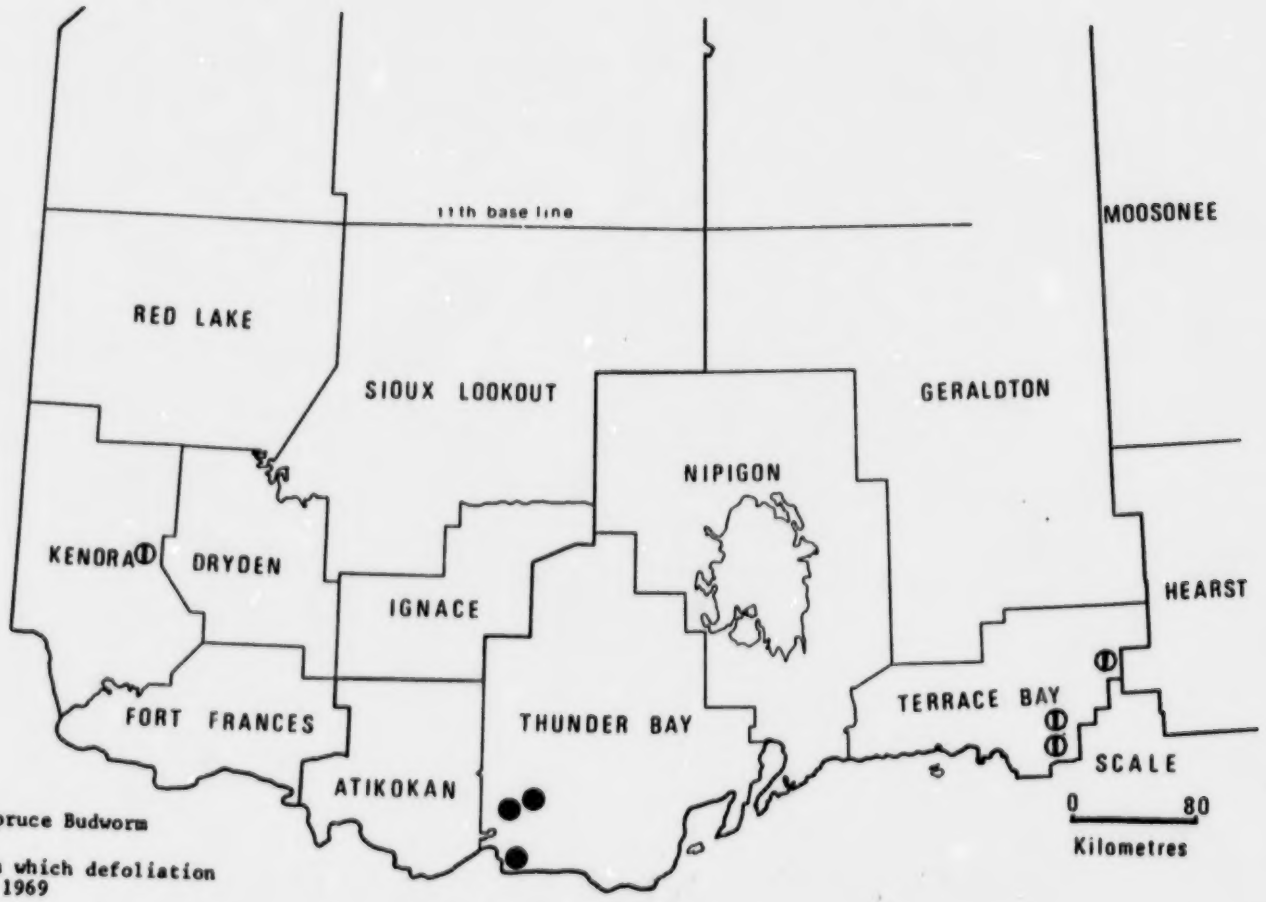
Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ⊠

NORTHWESTERN ONTARIO



Spruce Budworm

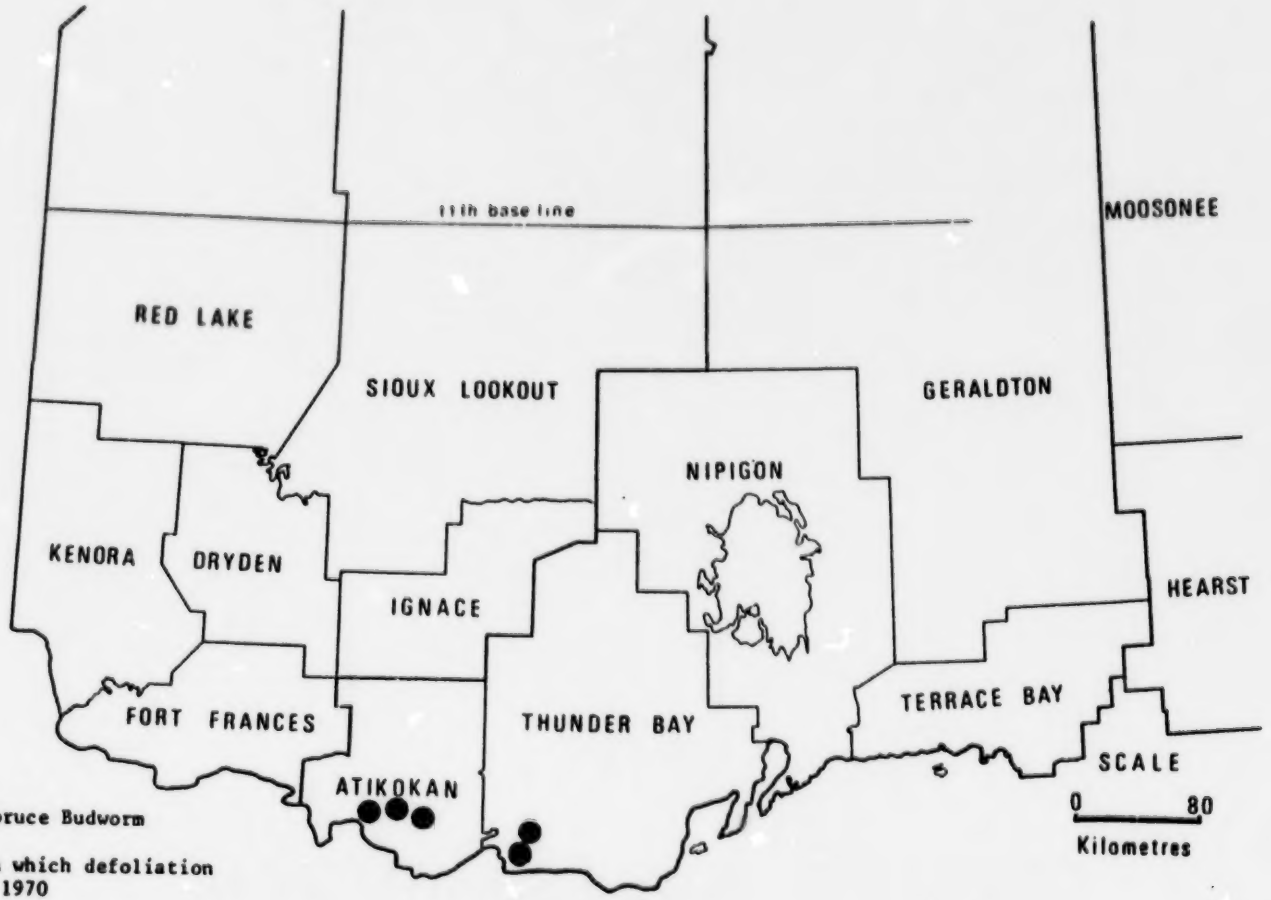
Areas within which defoliation occurred in 1969

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



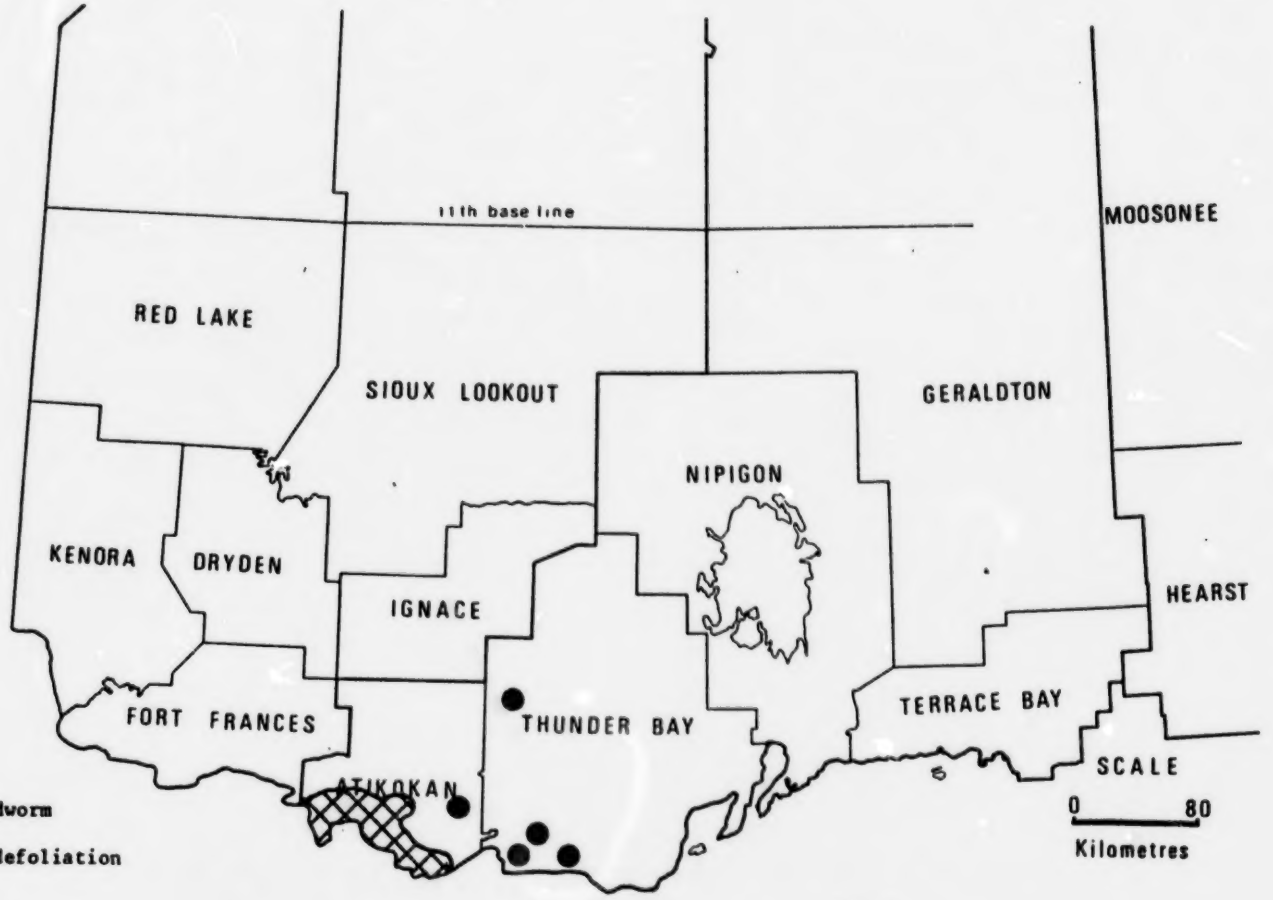
Spruce Budworm

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



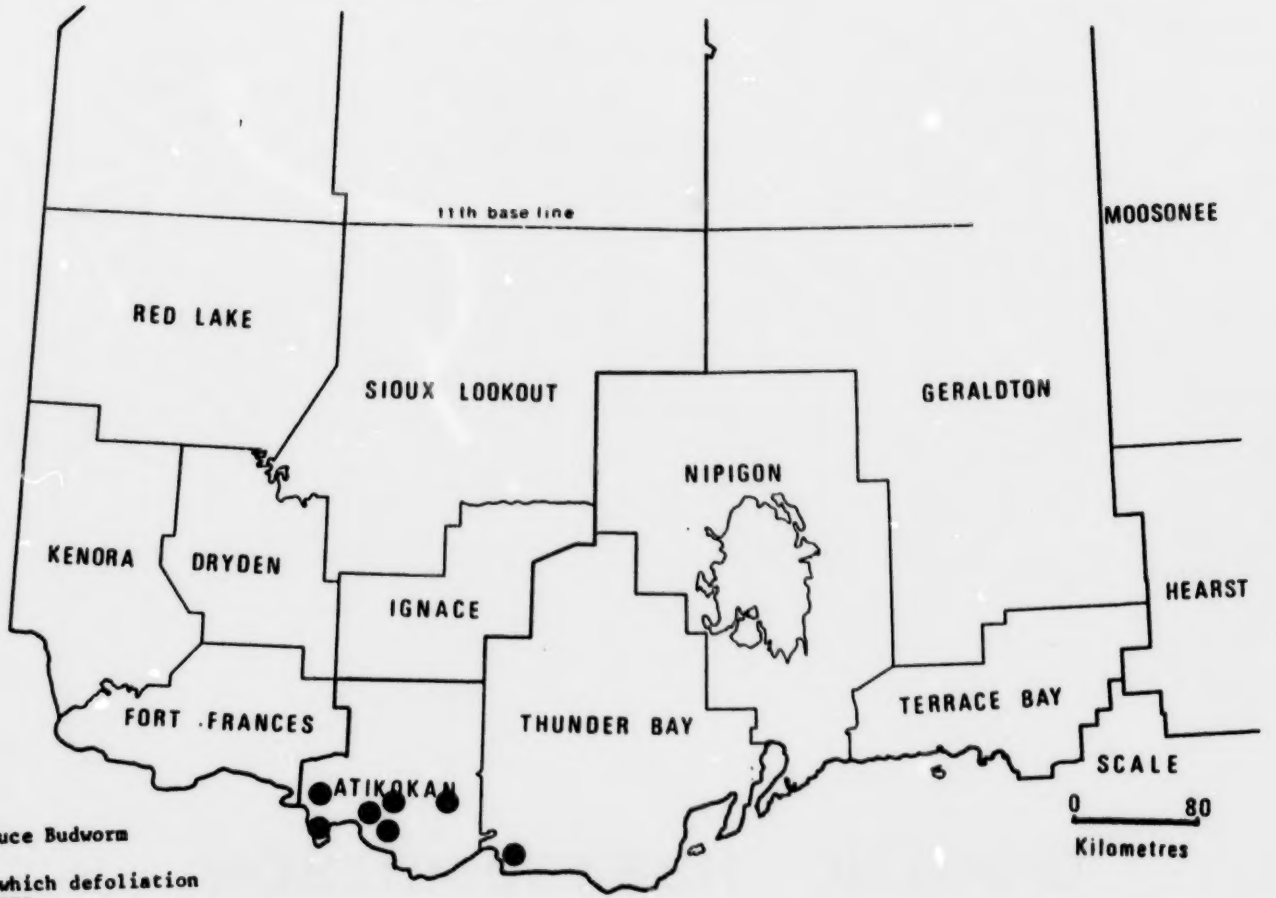
Spruce Budworm

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



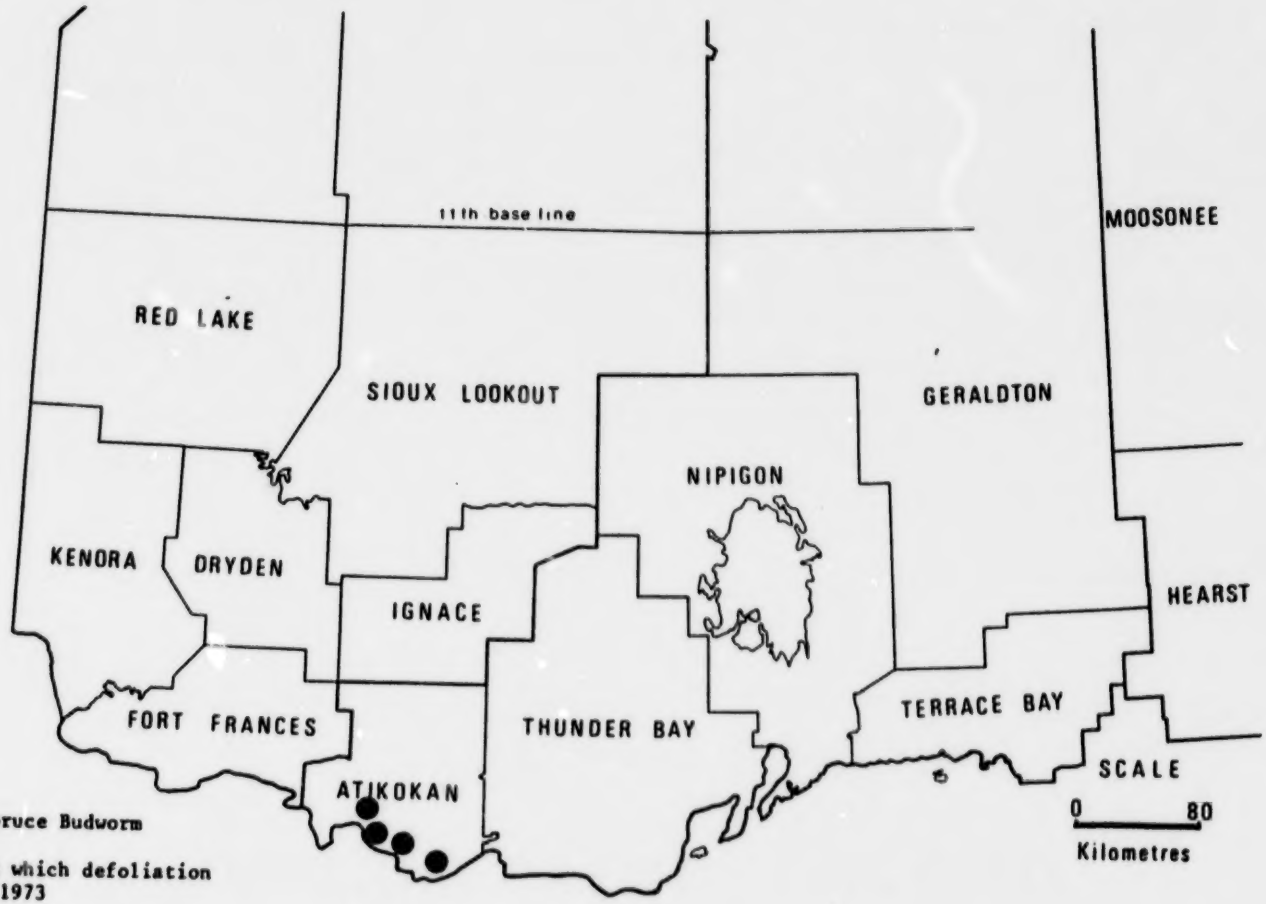
Spruce Budworm

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



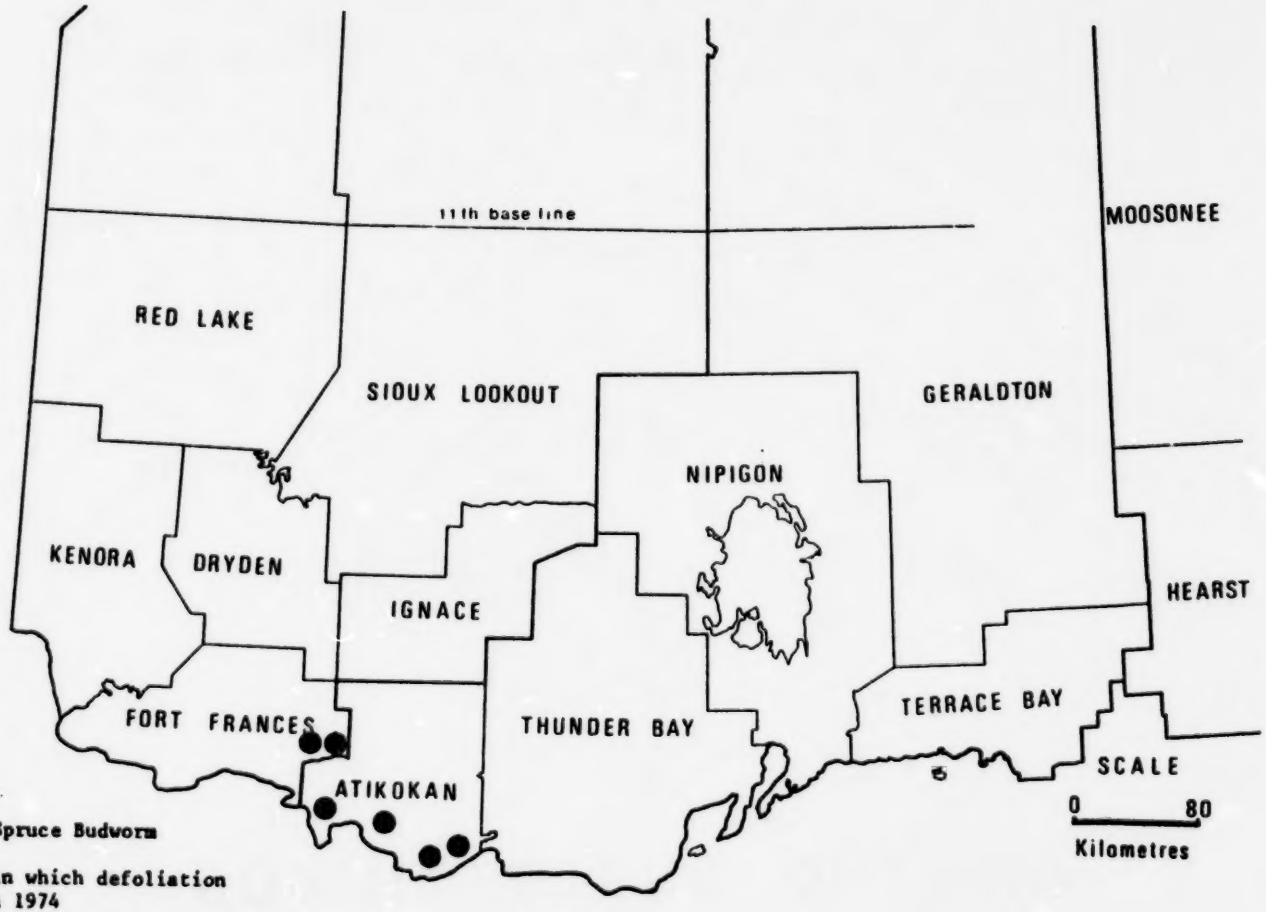
Spruce Budworm

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



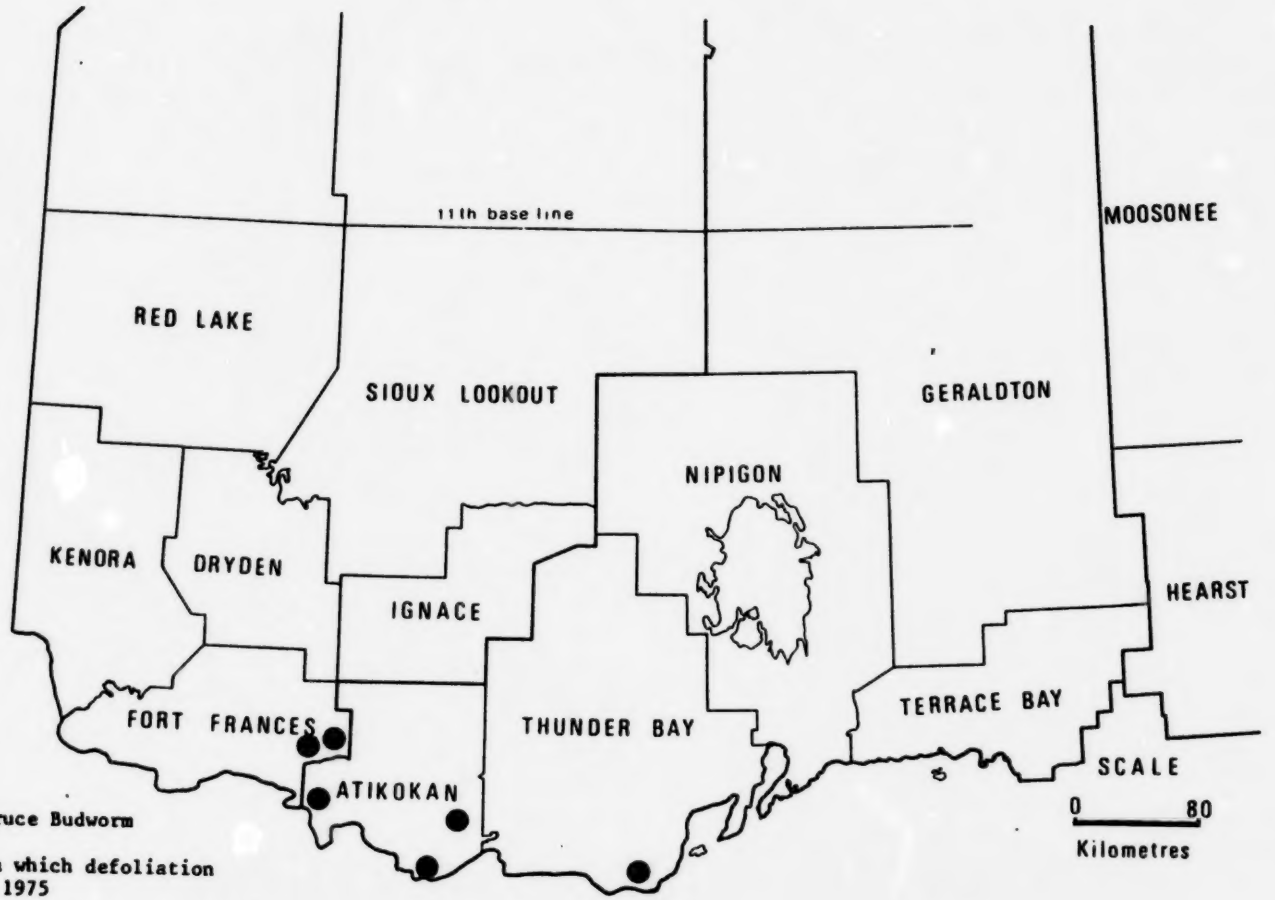
Spruce Budworm

Areas within which defoliation occurred in 1974

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



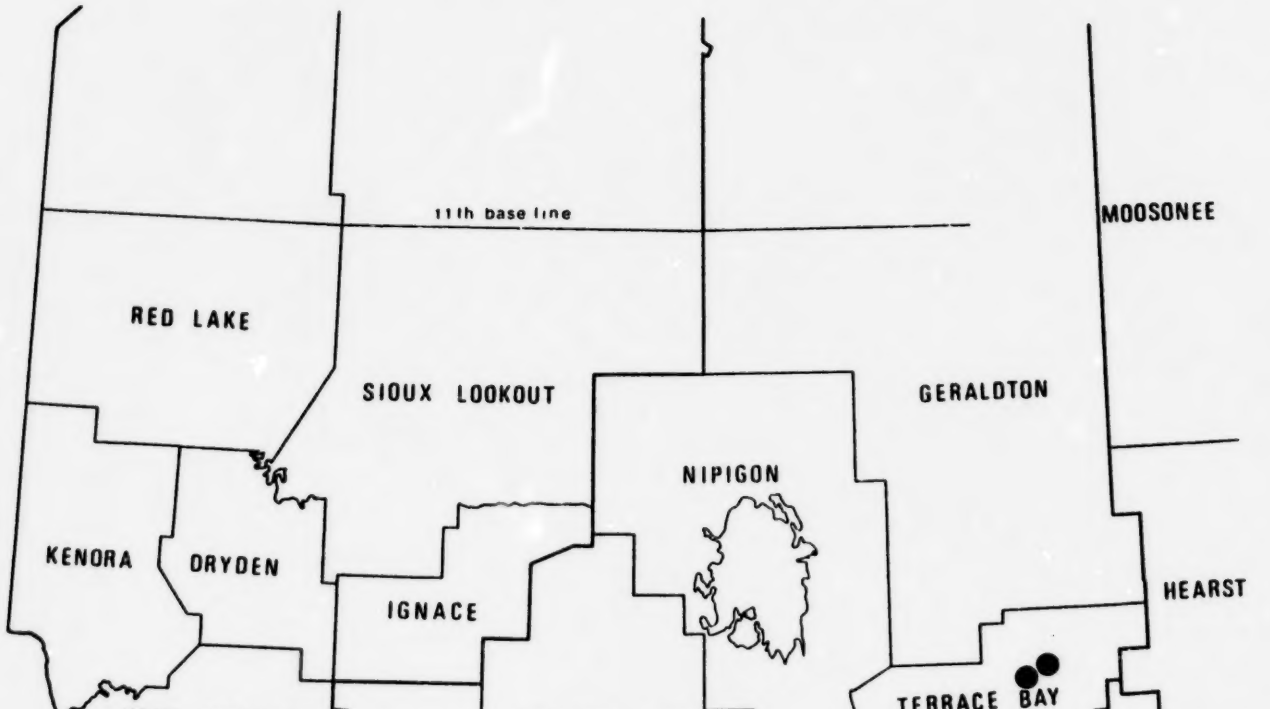
Spruce Budworm

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



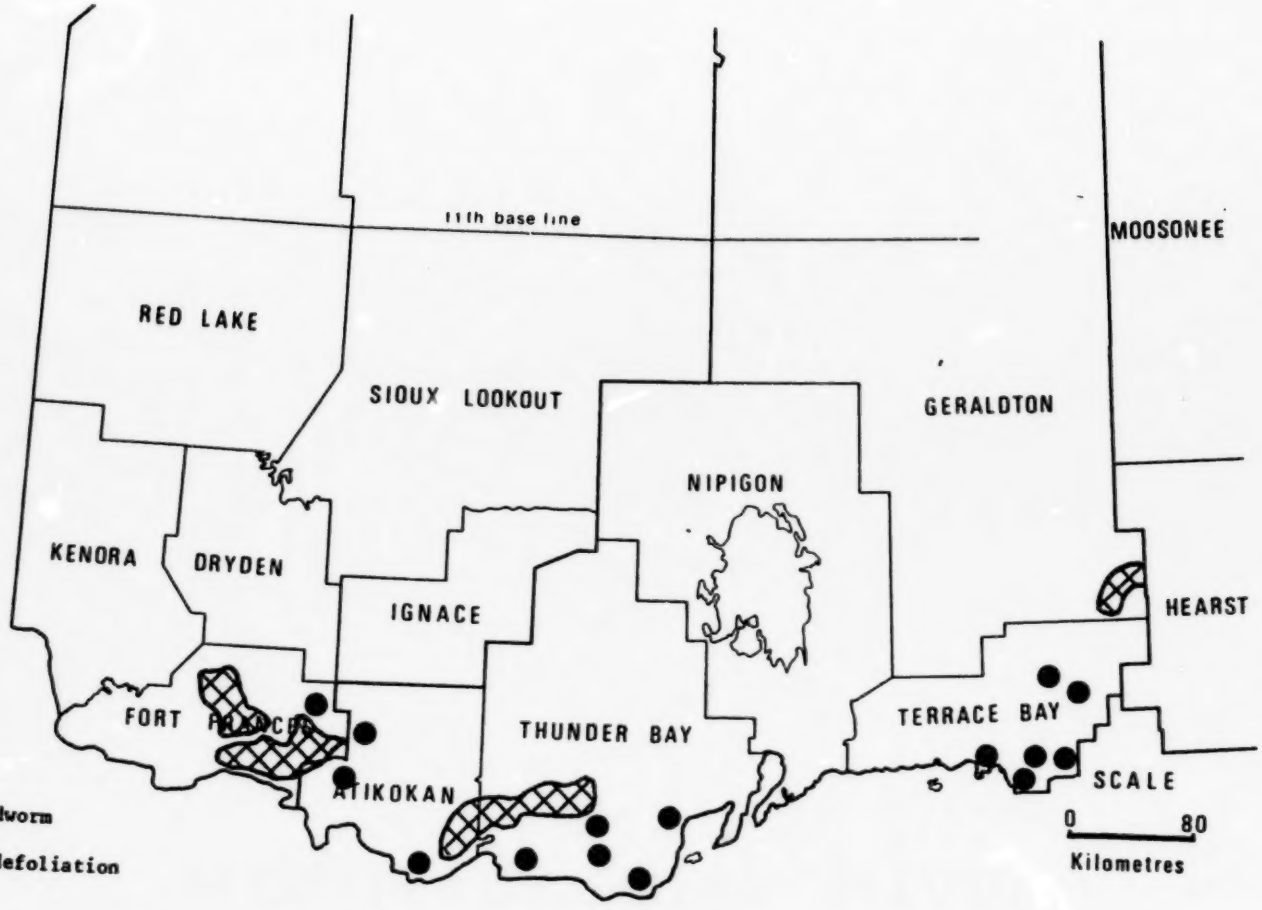
Spruce Budworm

Areas within which defoliation occurred in 1976

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



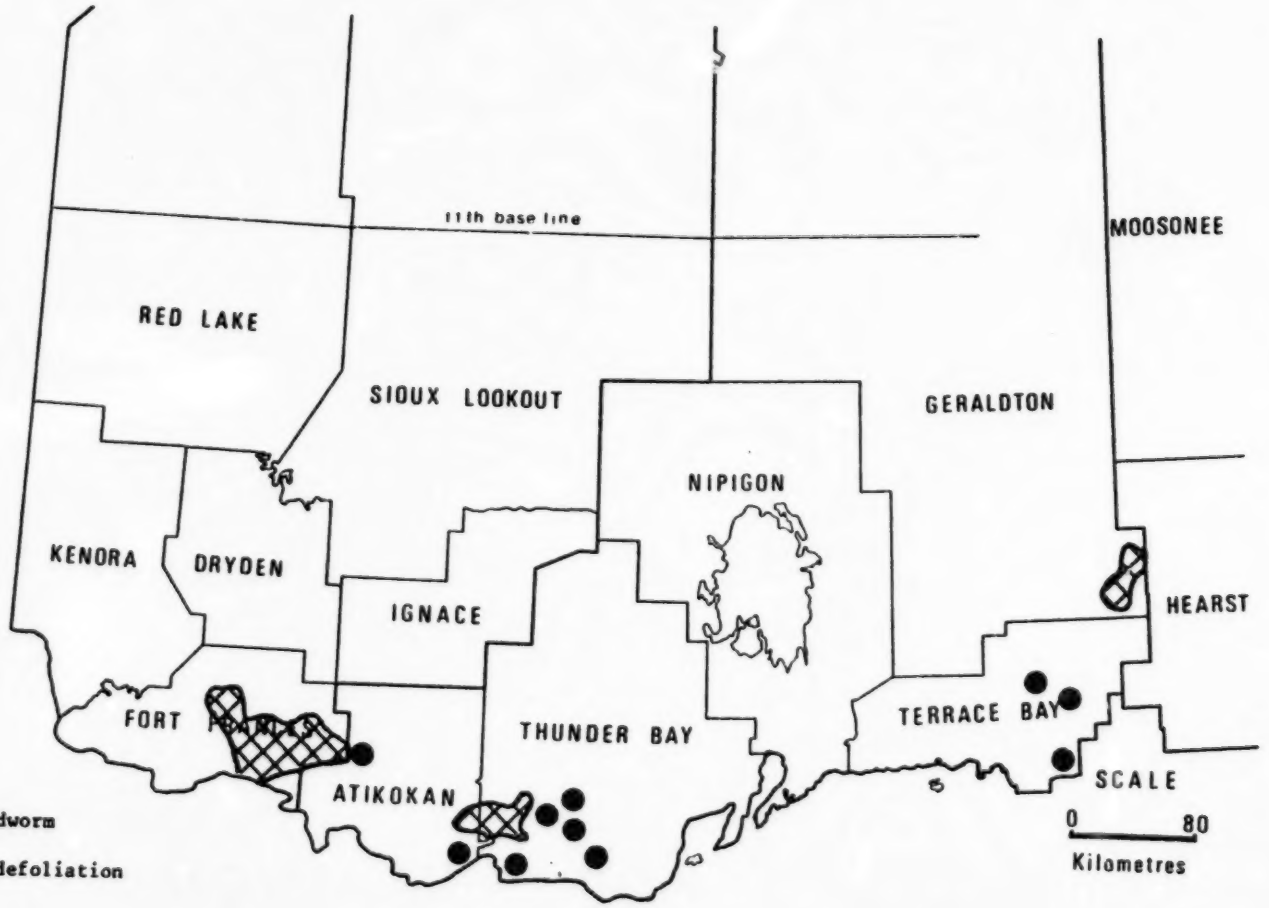
Spruce Budworm

Areas within which defoliation occurred in 1977 .

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



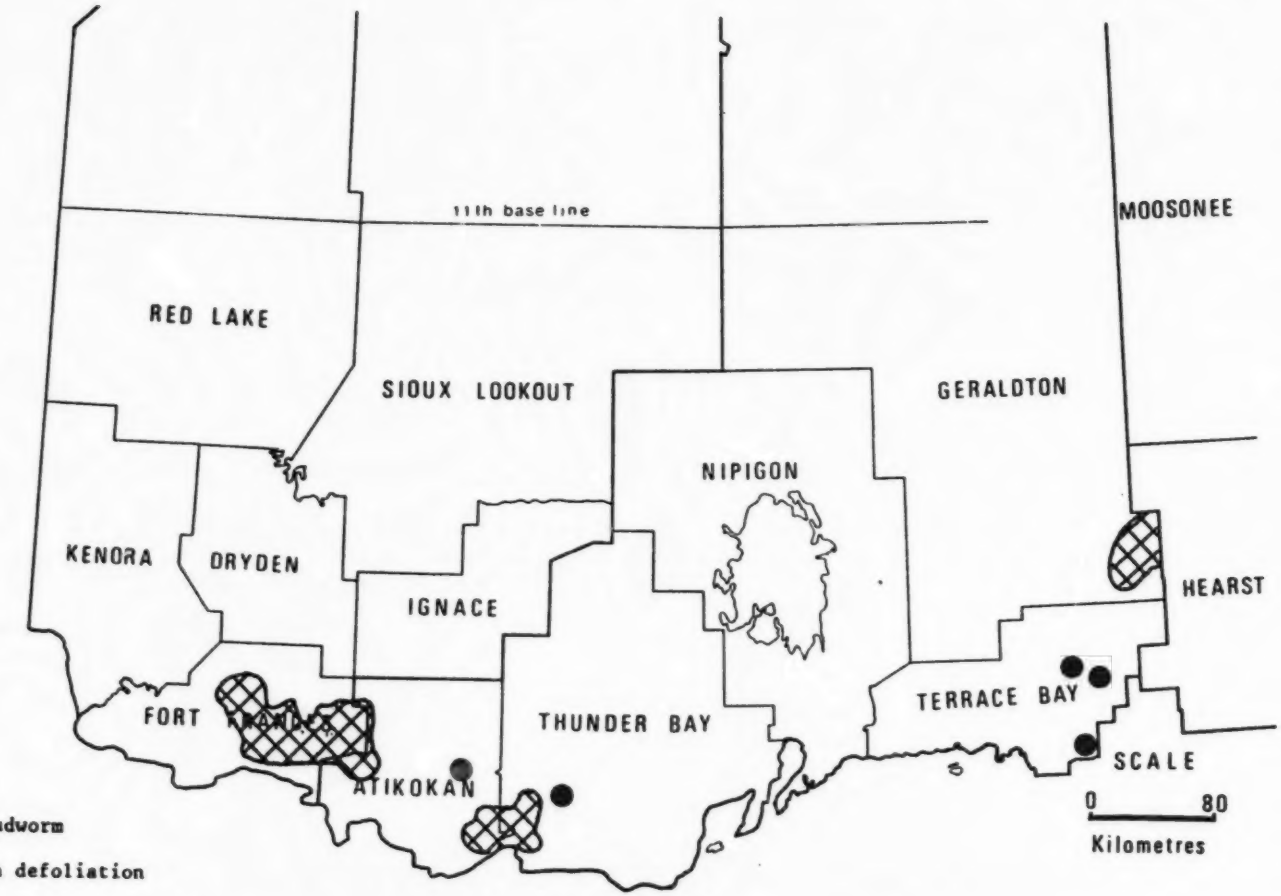
Spruce Budworm

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



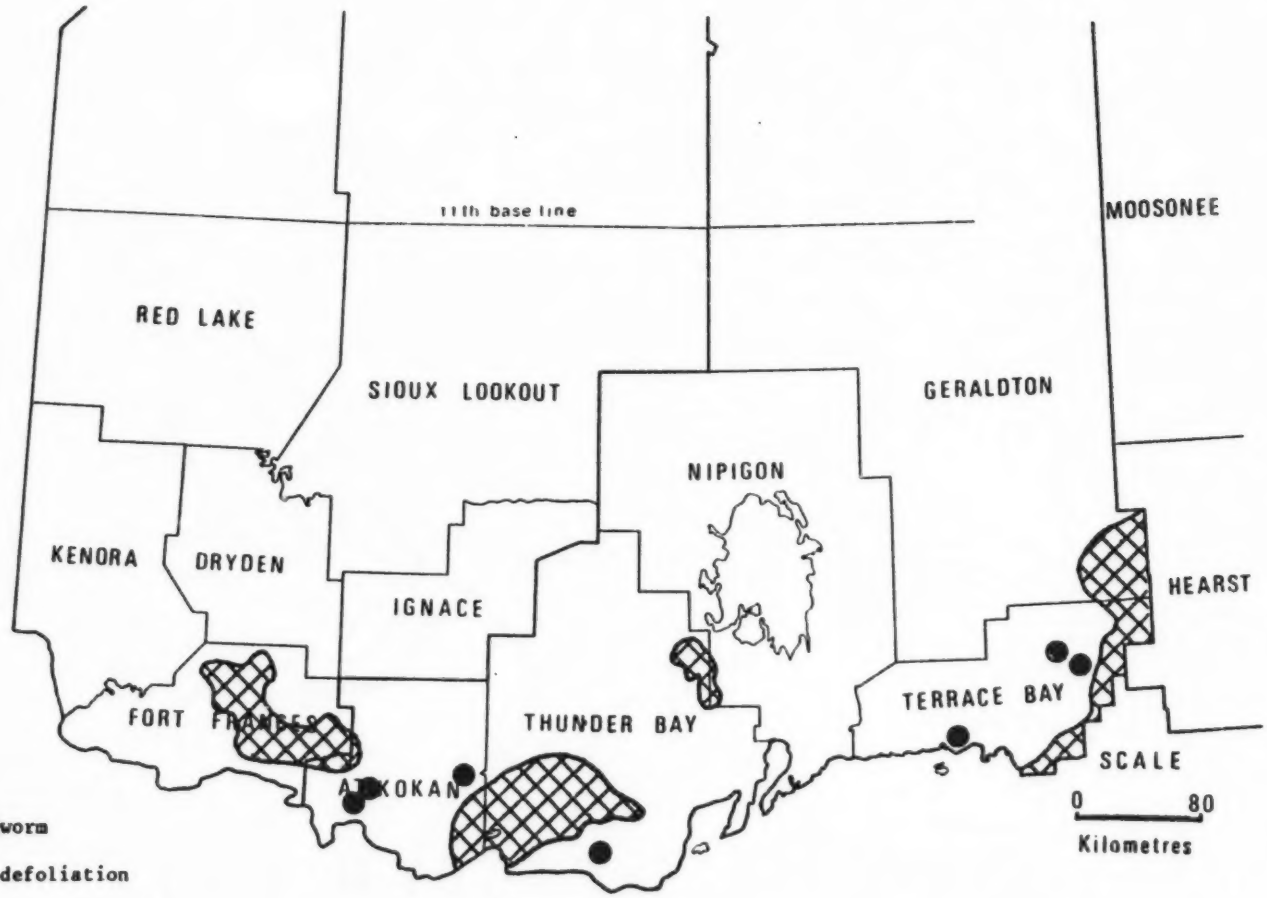
Spruce Budworm

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



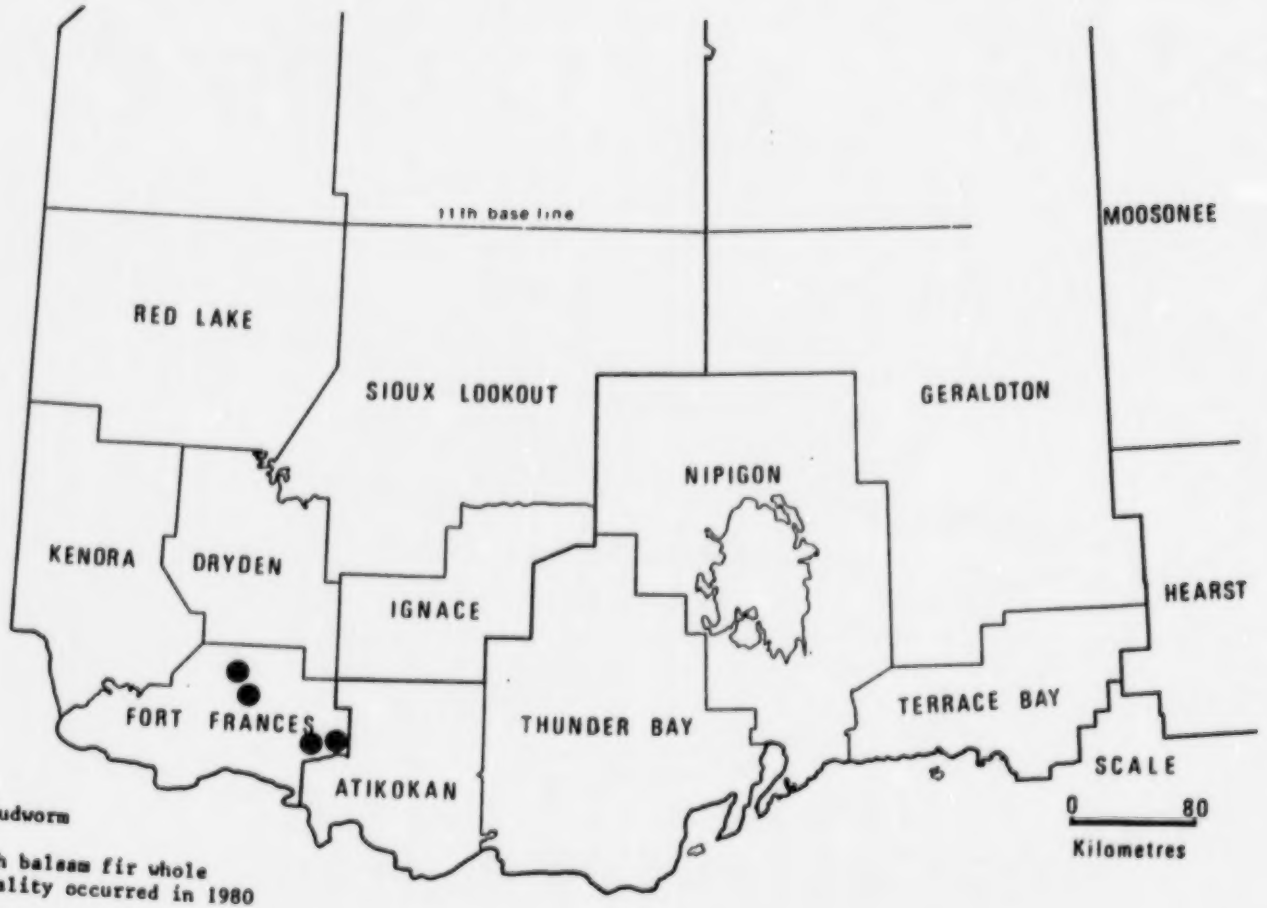
Spruce Budworm

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



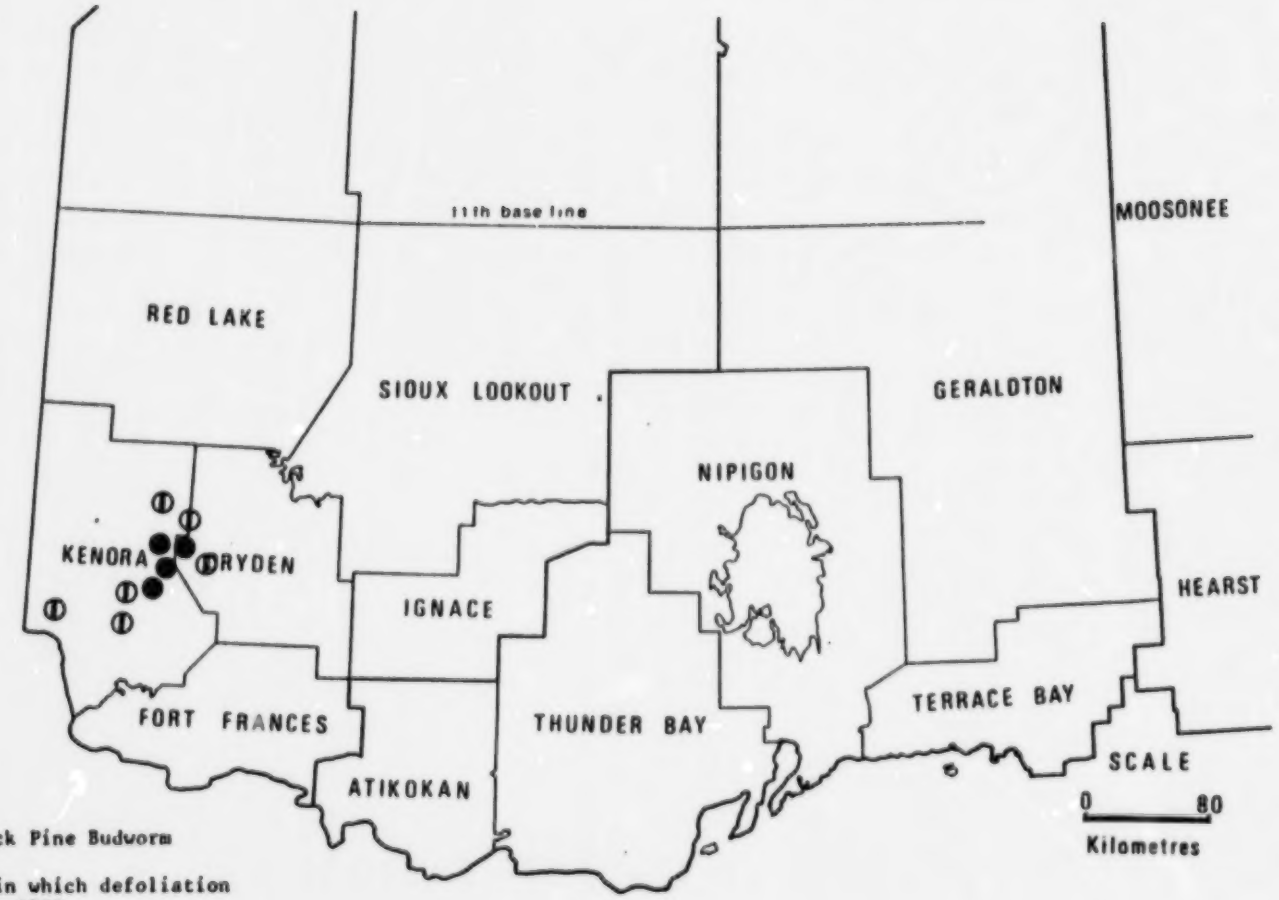
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1980

LEGEND

Mortality ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

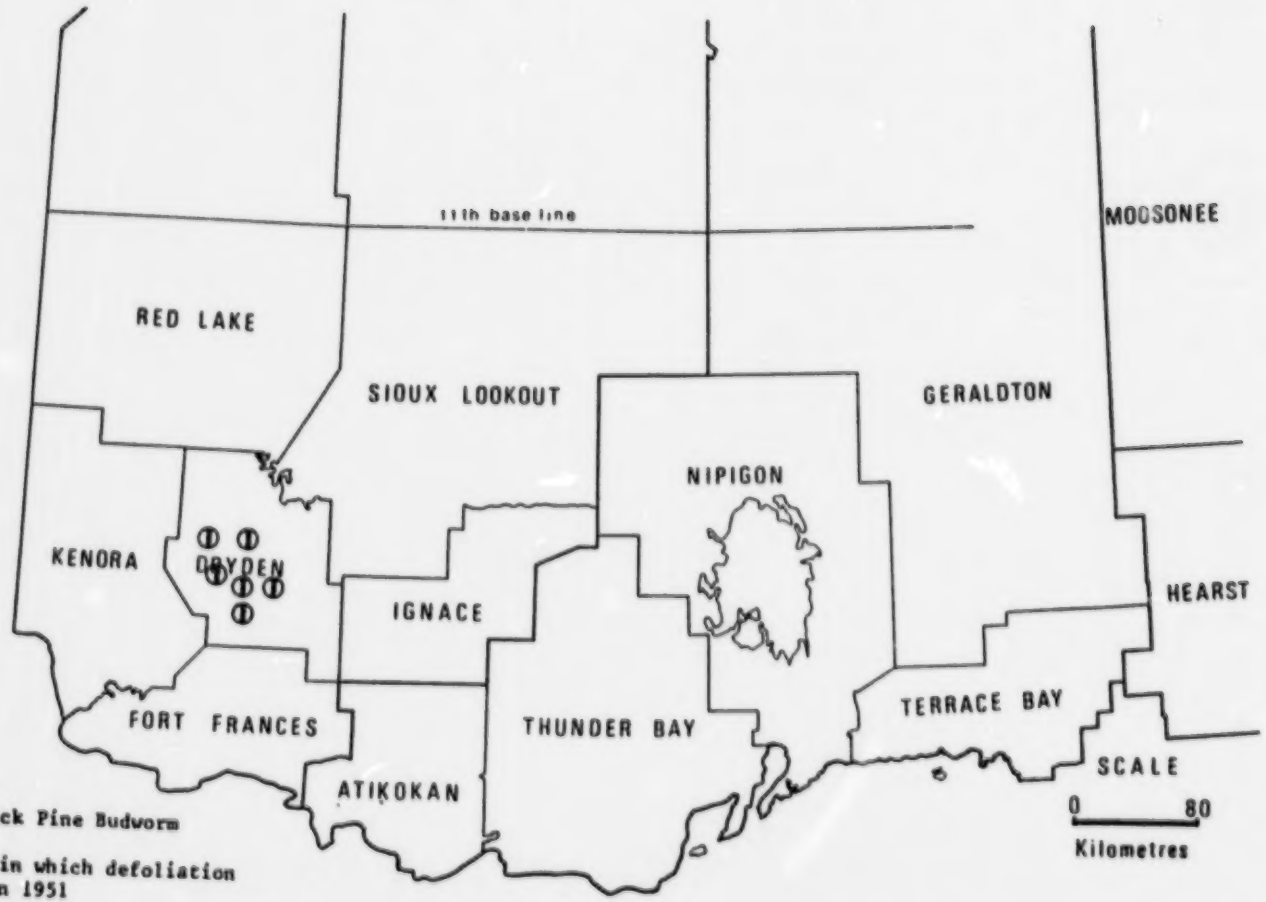
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



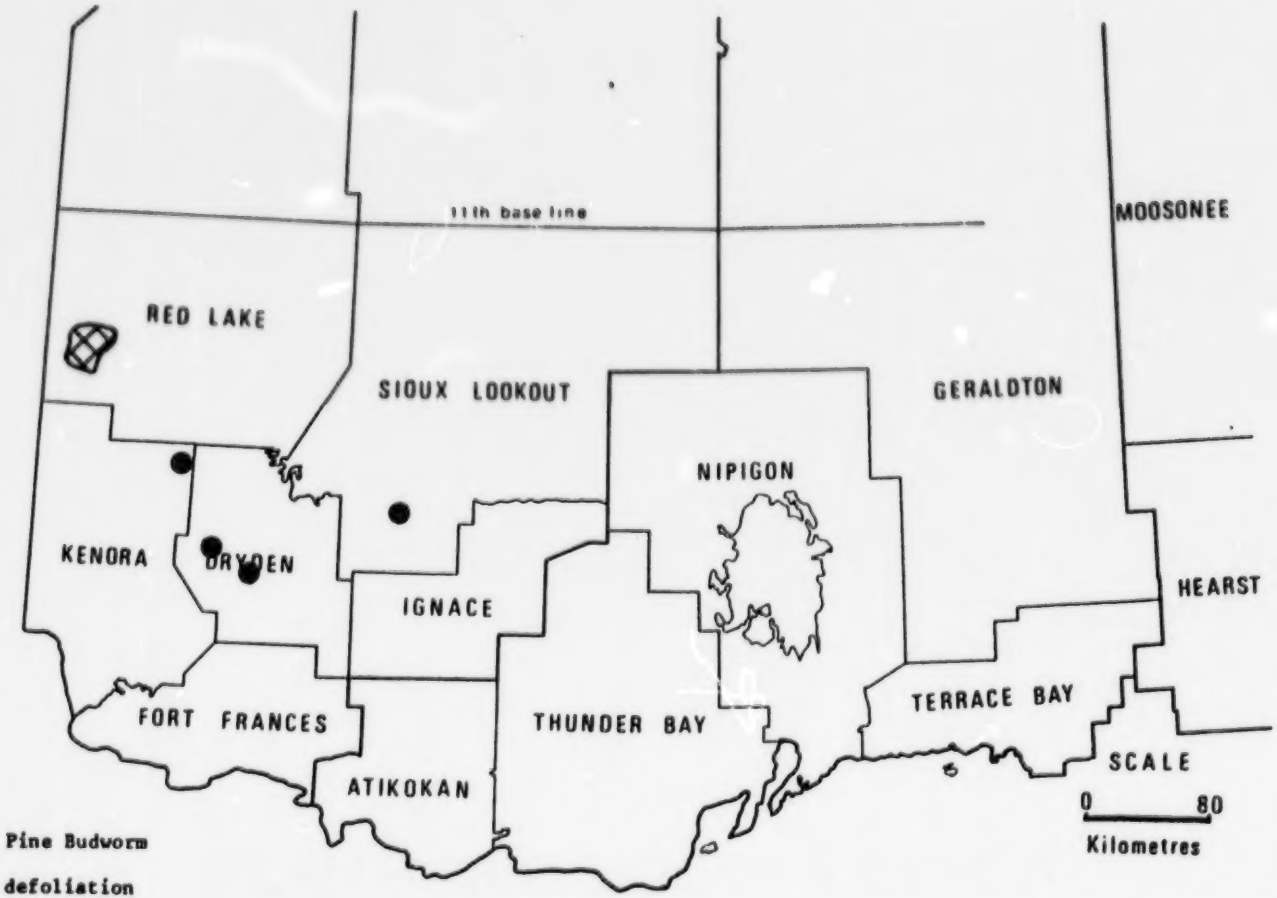
Jack Pine Budworm

Areas within which defoliation occurred in 1951

LEGEND

Light defoliation ①

NORTHWESTERN ONTARIO



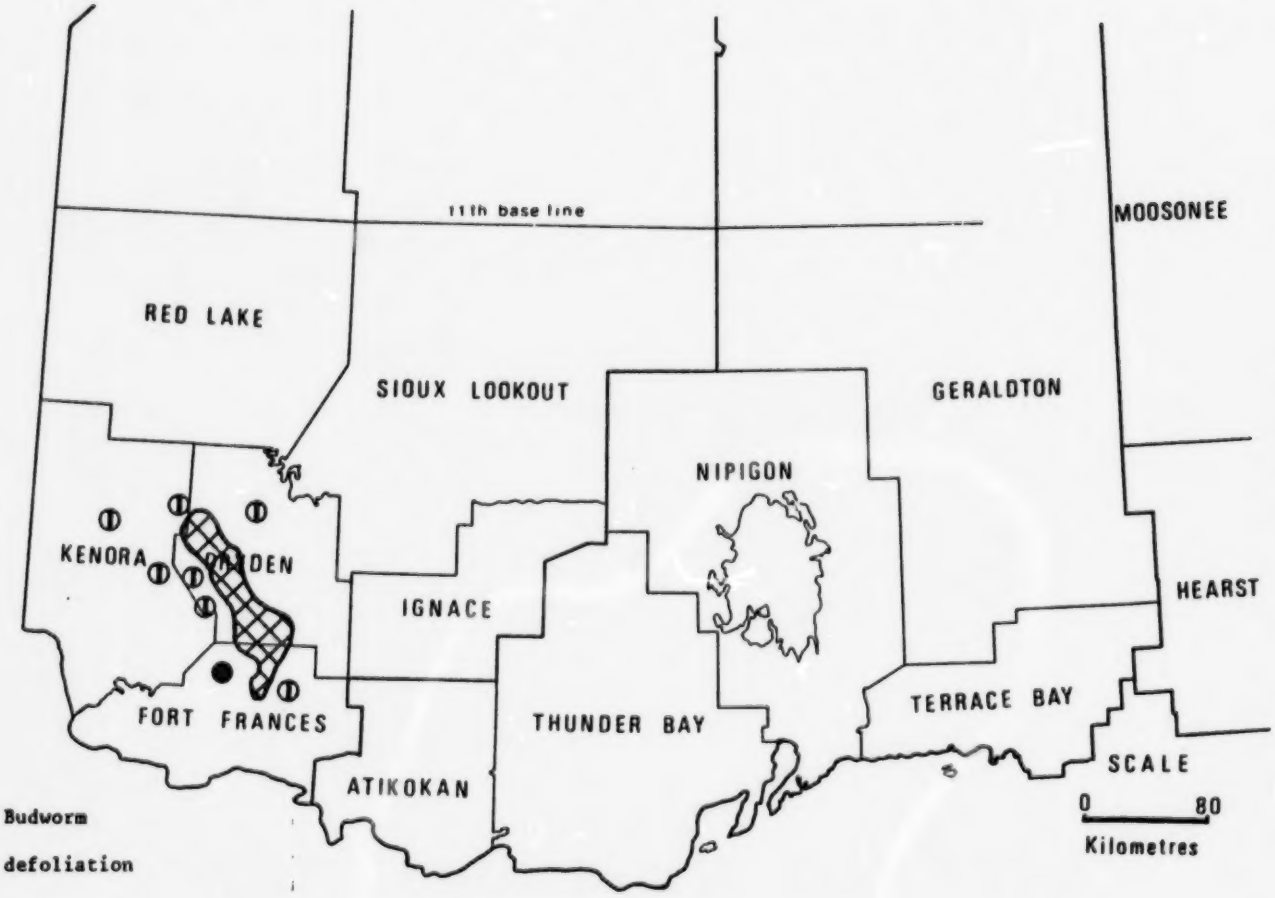
Jack Pine Budworm

Areas within which defoliation occurred in 1954

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Jack Pine Budworm

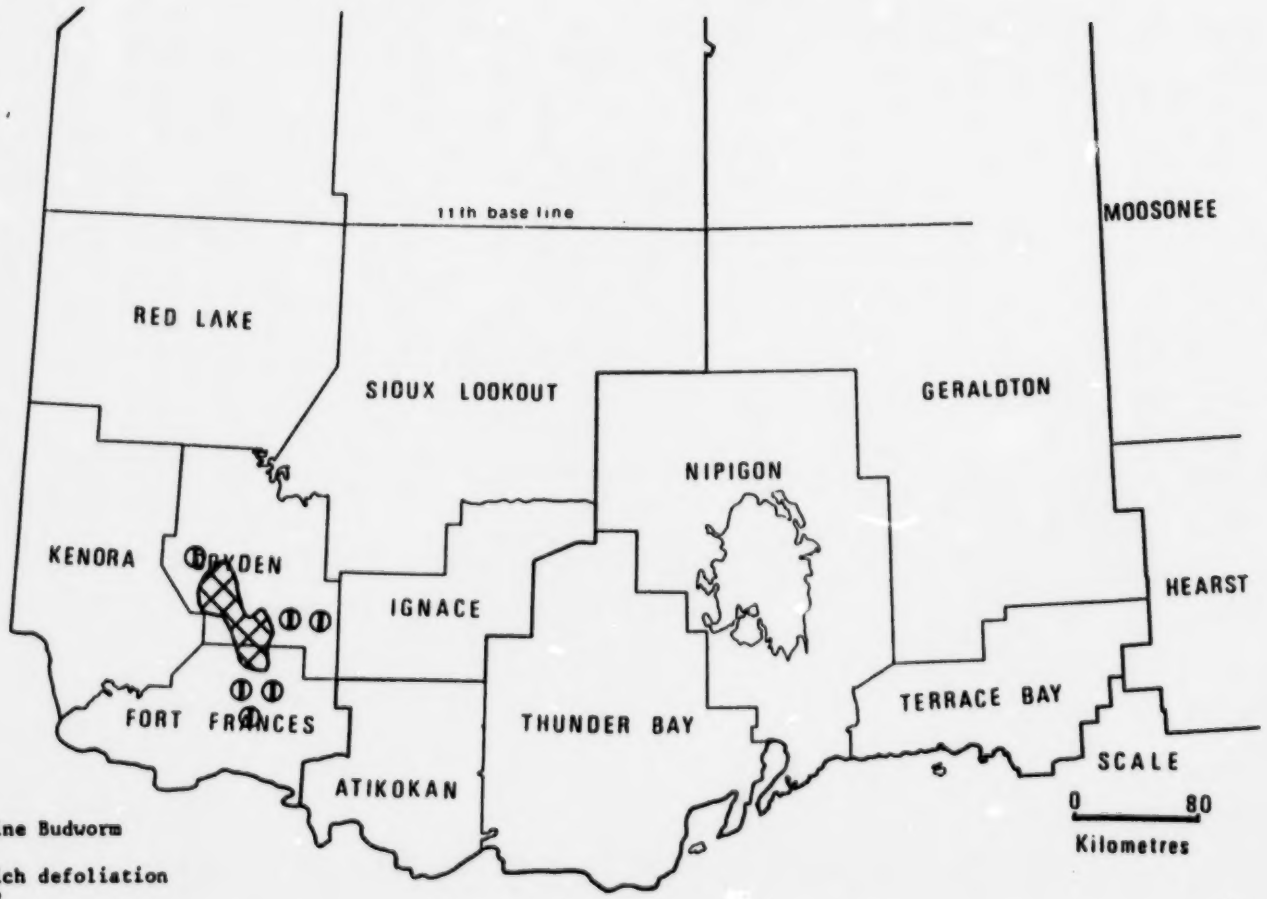
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◑ or

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Jack Pine Budworm

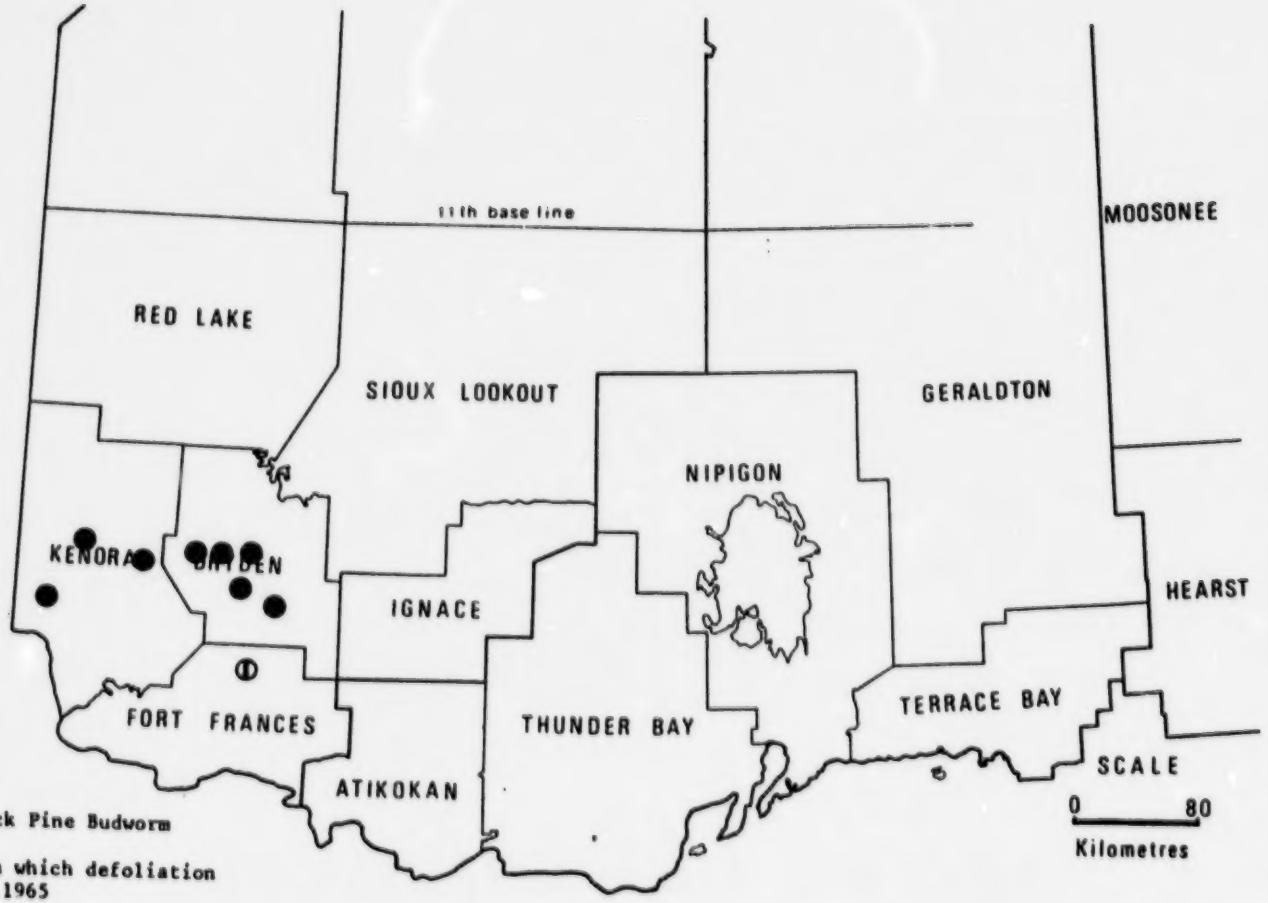
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ①

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Jack Pine Budworm

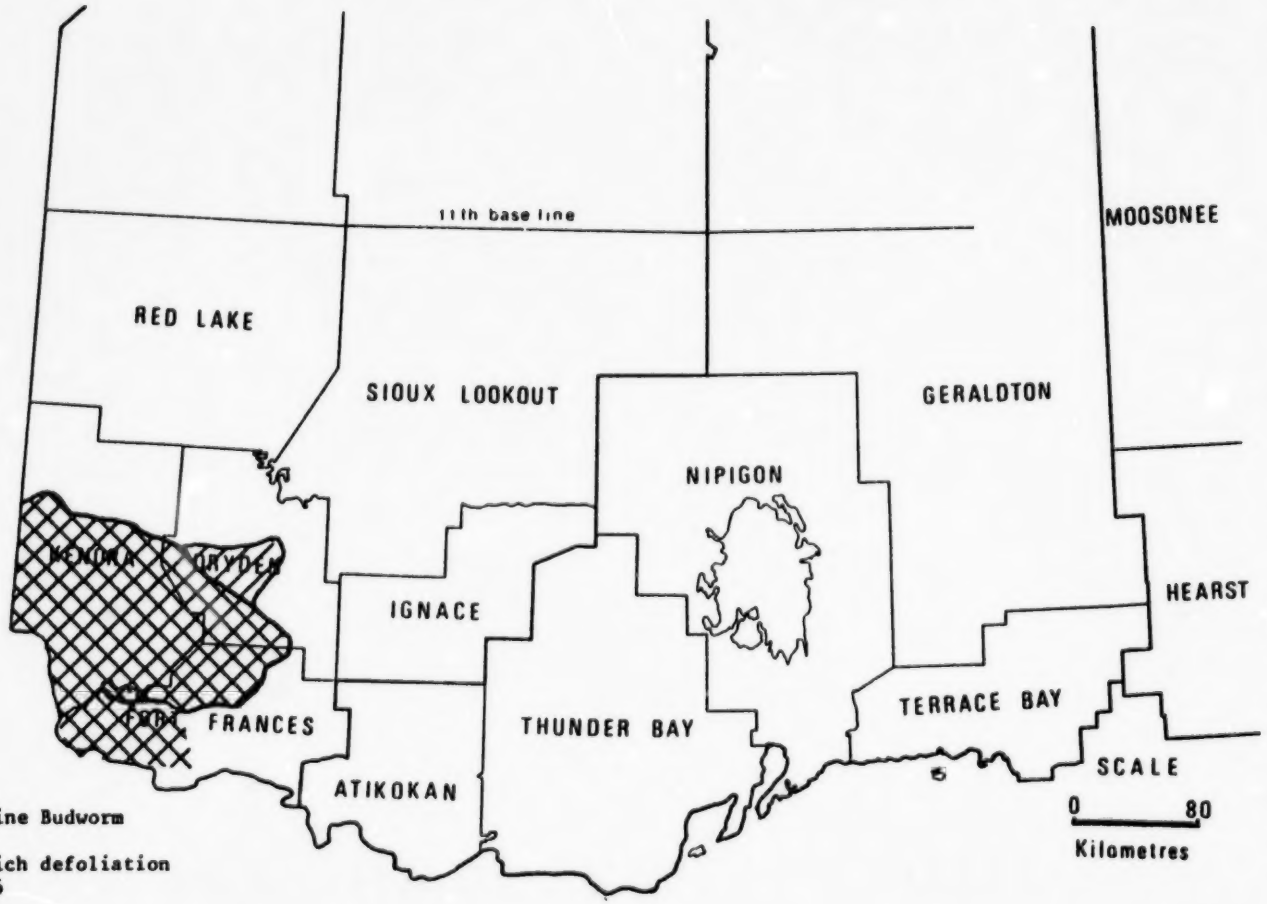
Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

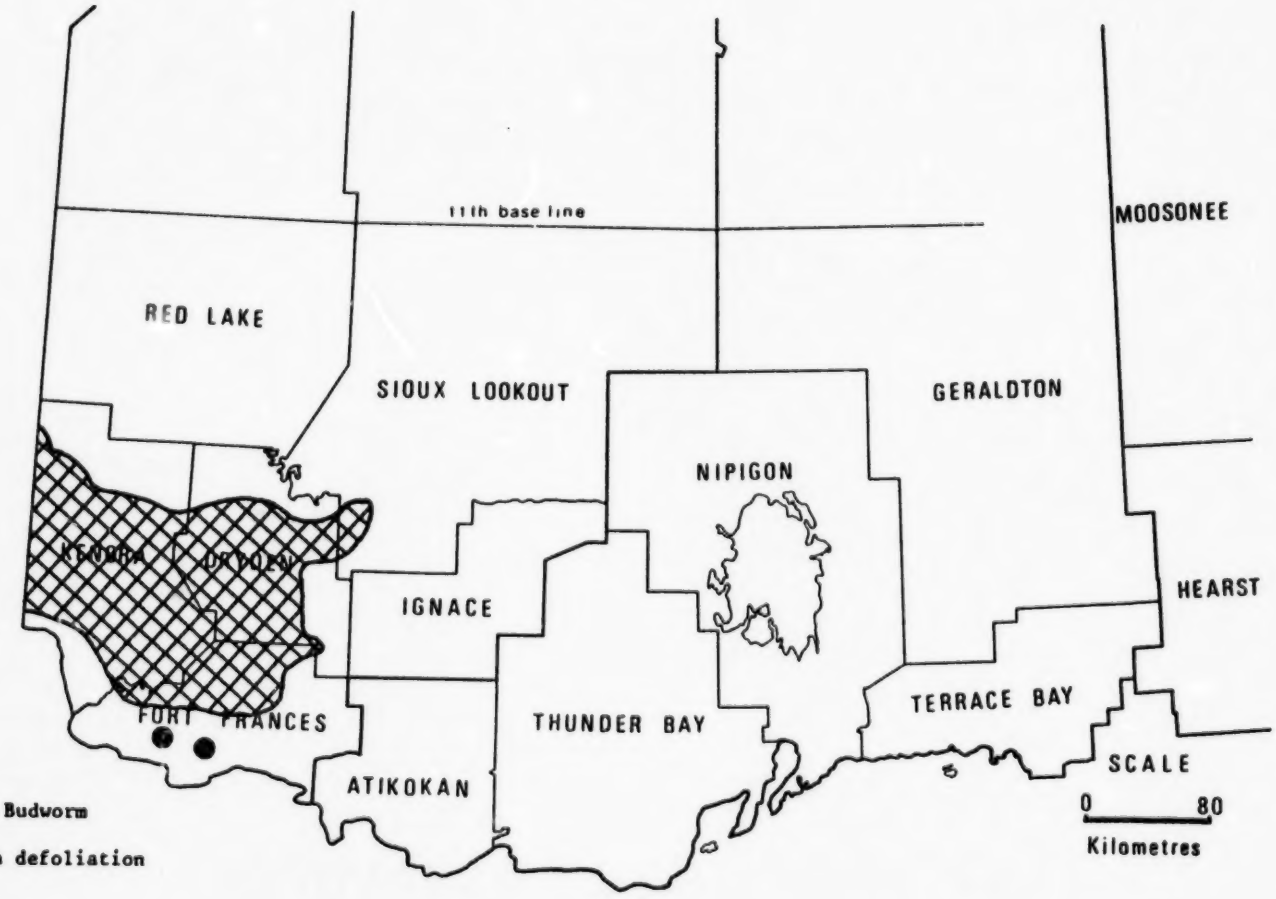
Areas within which defoliation occurred in 1966

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



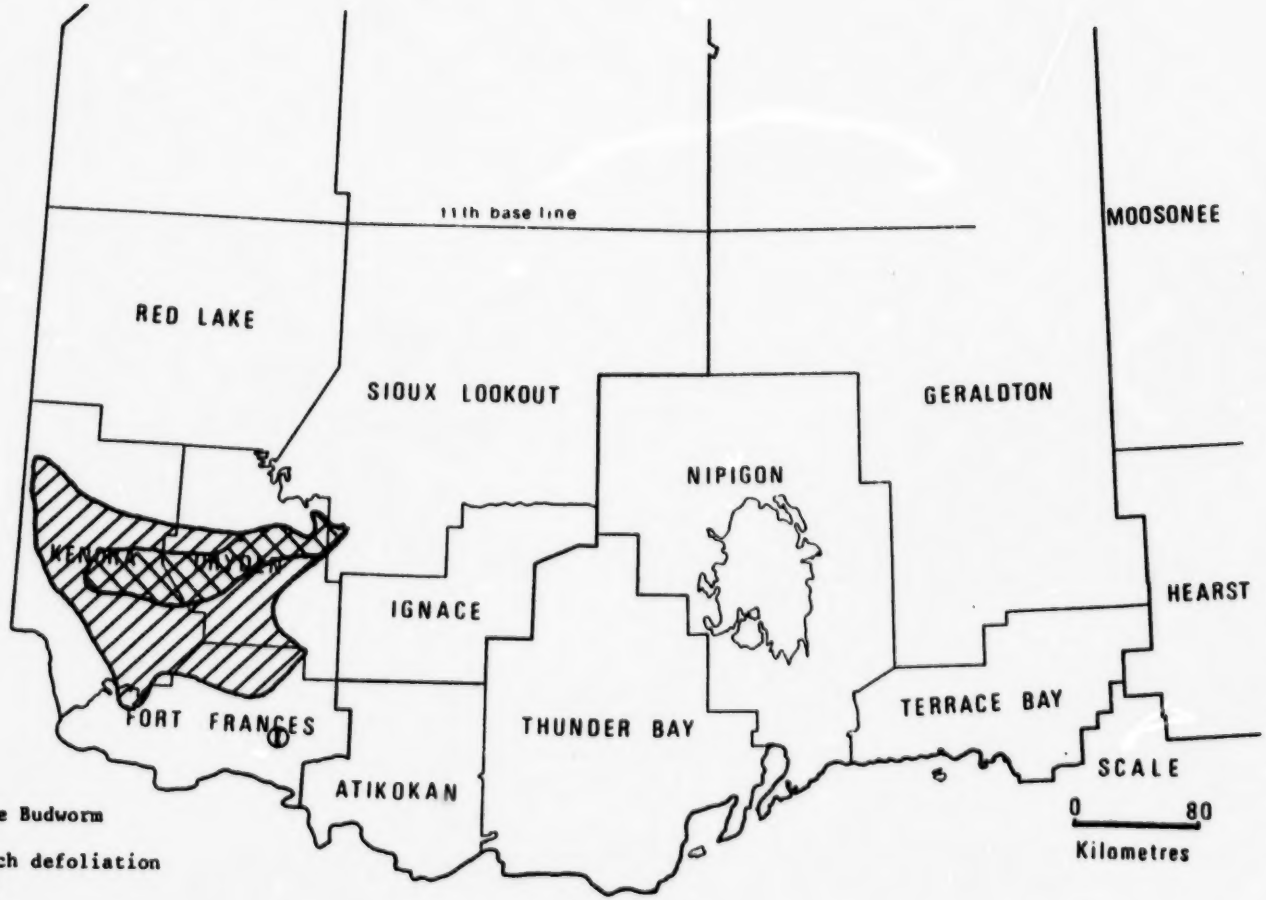
Jack Pine Budworm

Areas within which defoliation occurred in 1967

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Jack Pine Budworm

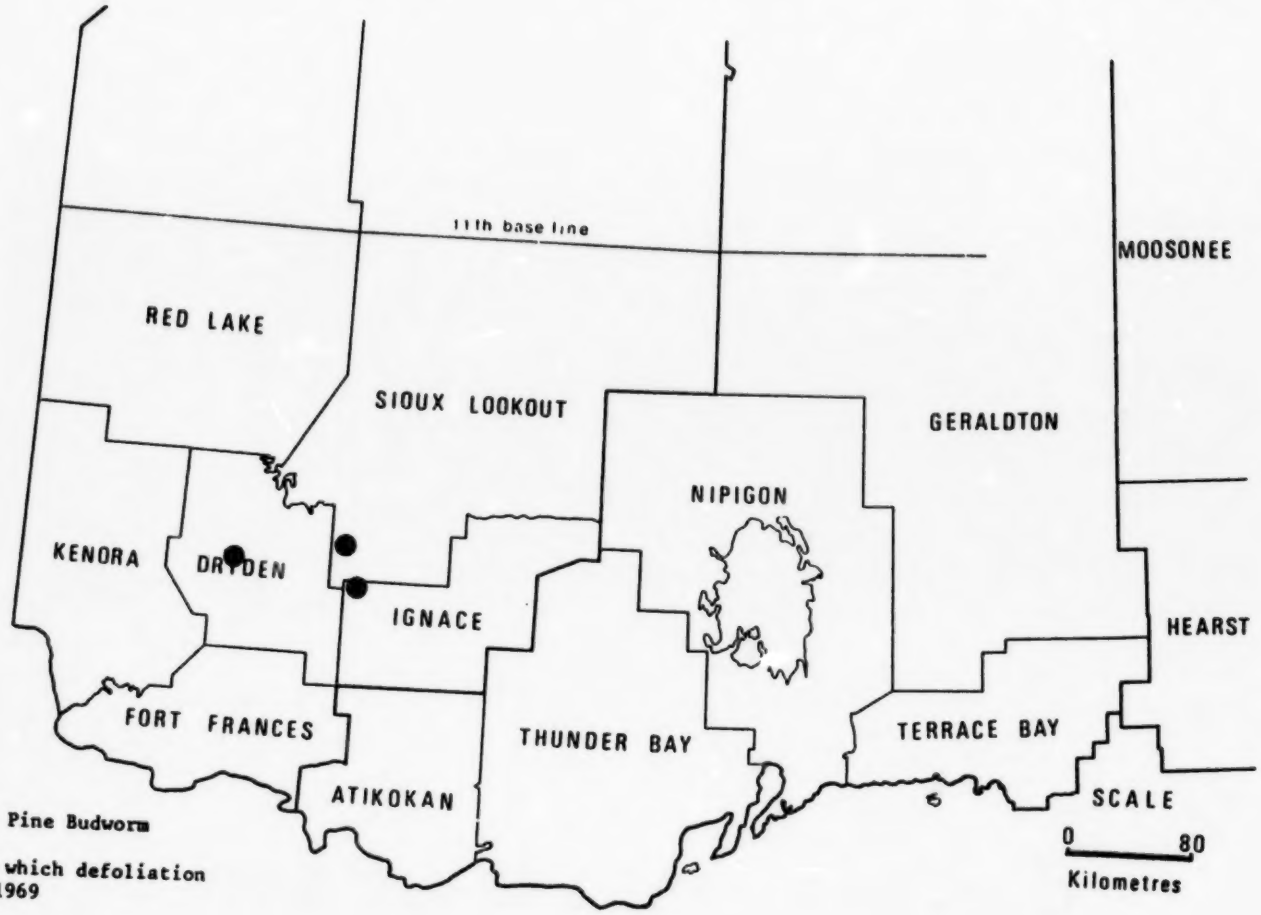
Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ⊕ or

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



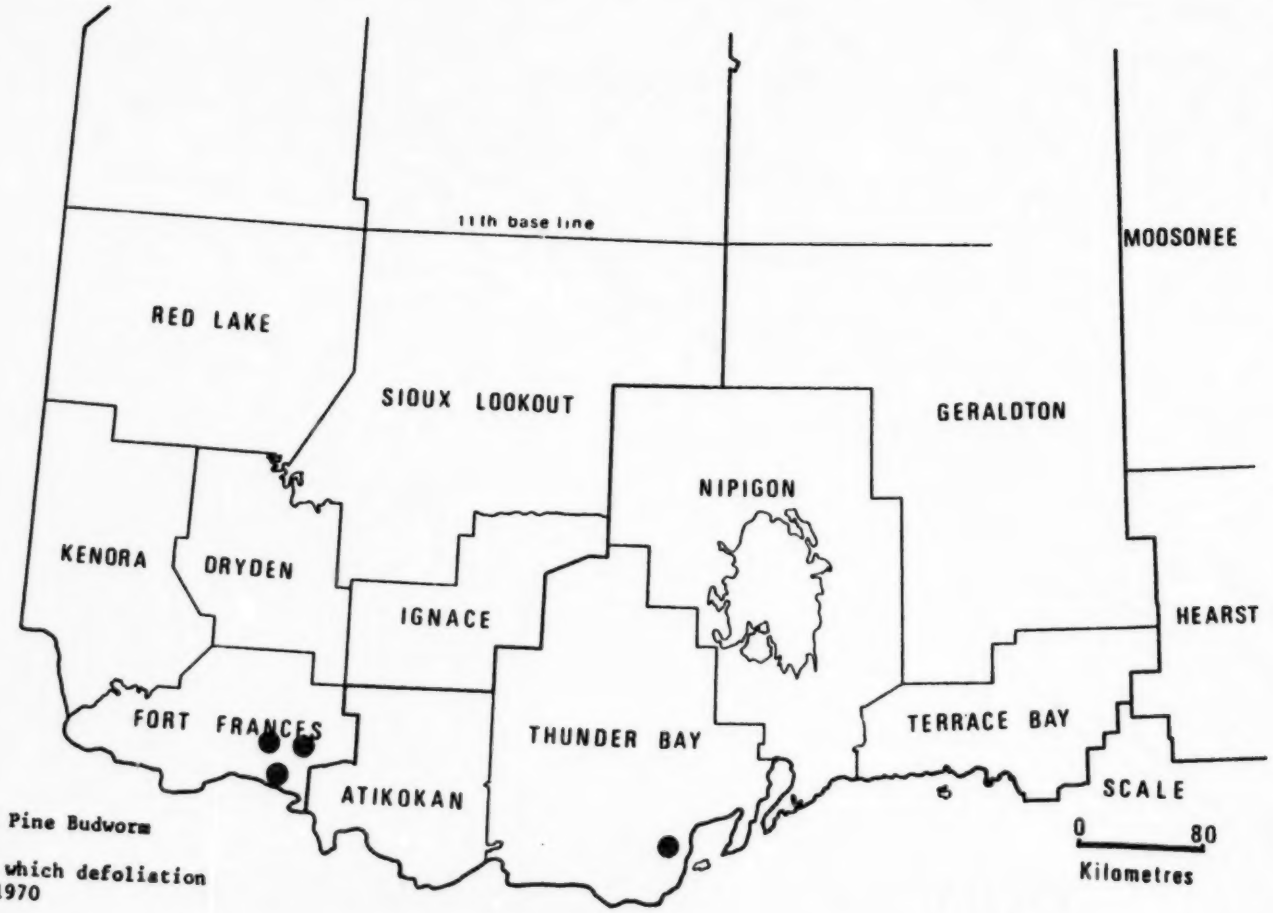
Jack Pine Budworm

Areas within which defoliation occurred in 1969

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



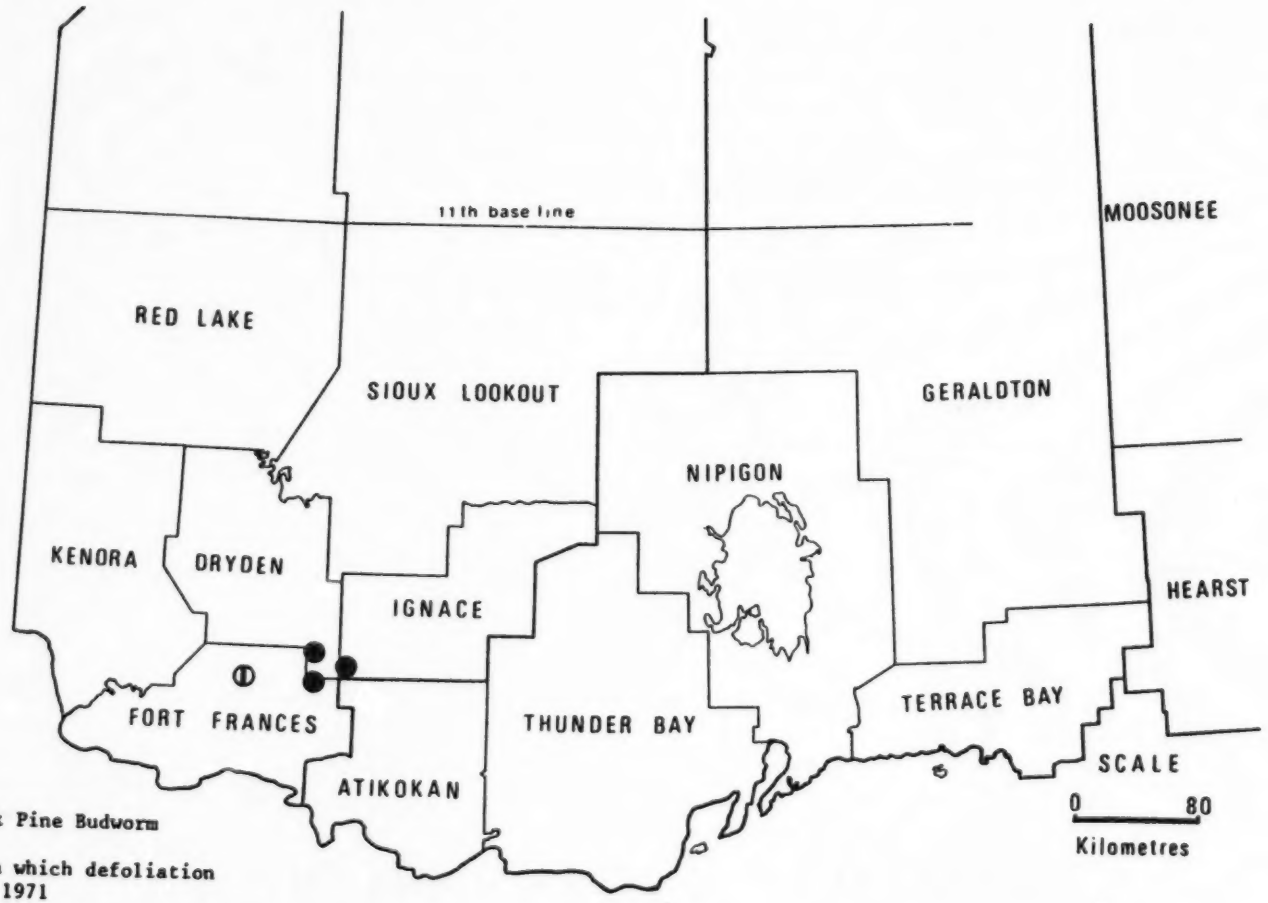
Jack Pine Budworm

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

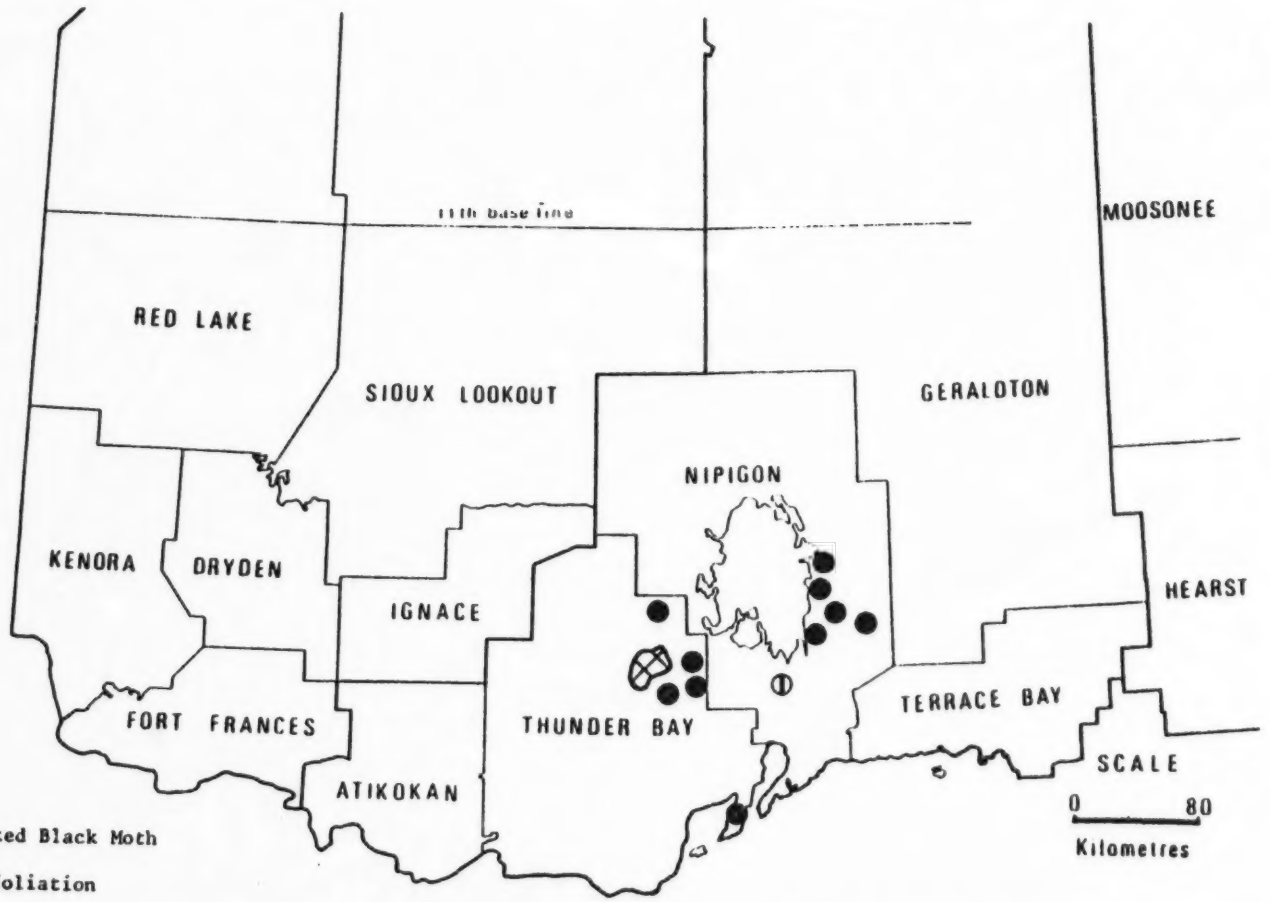
Areas within which defoliation occurred in 1971

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spearmarked Black Moth

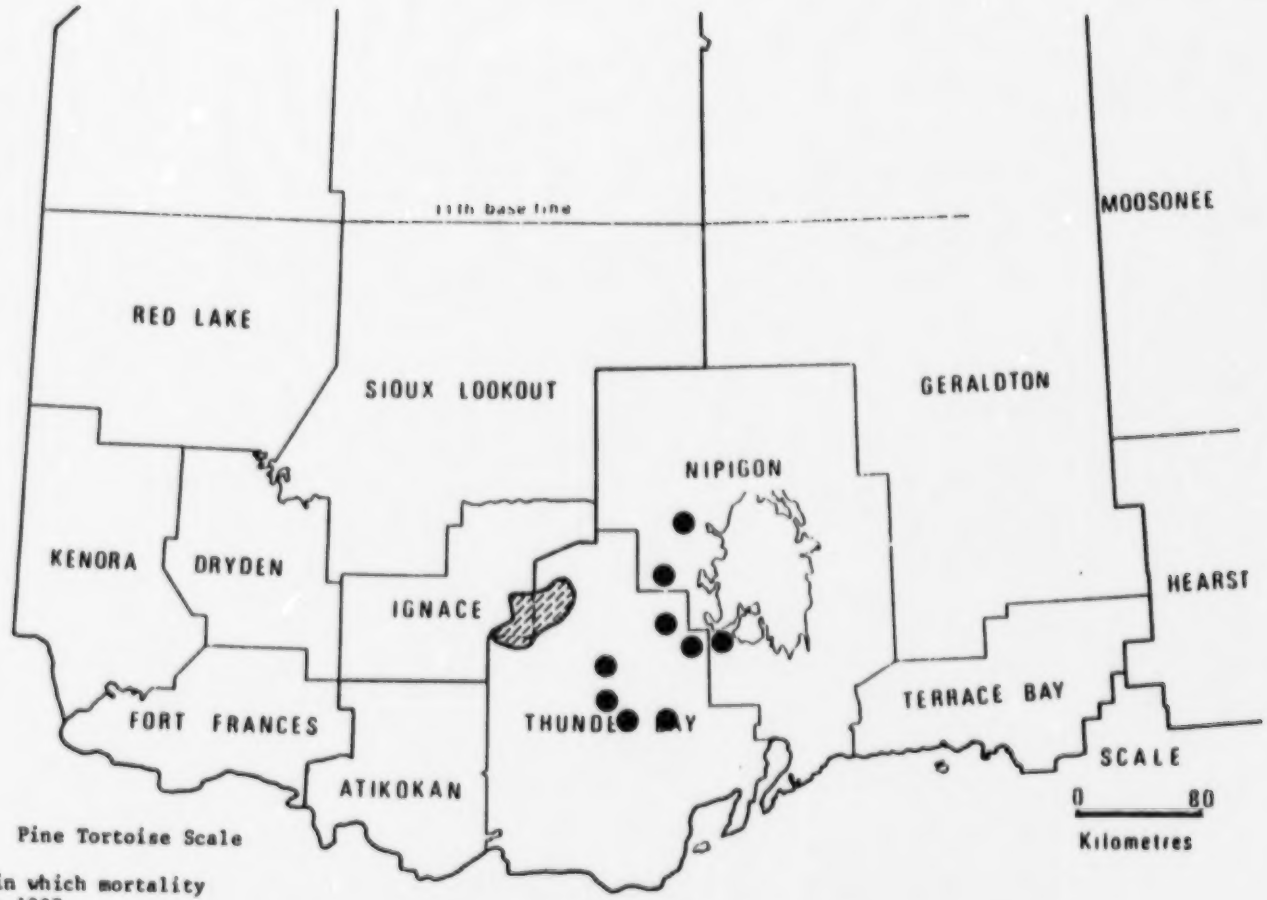
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



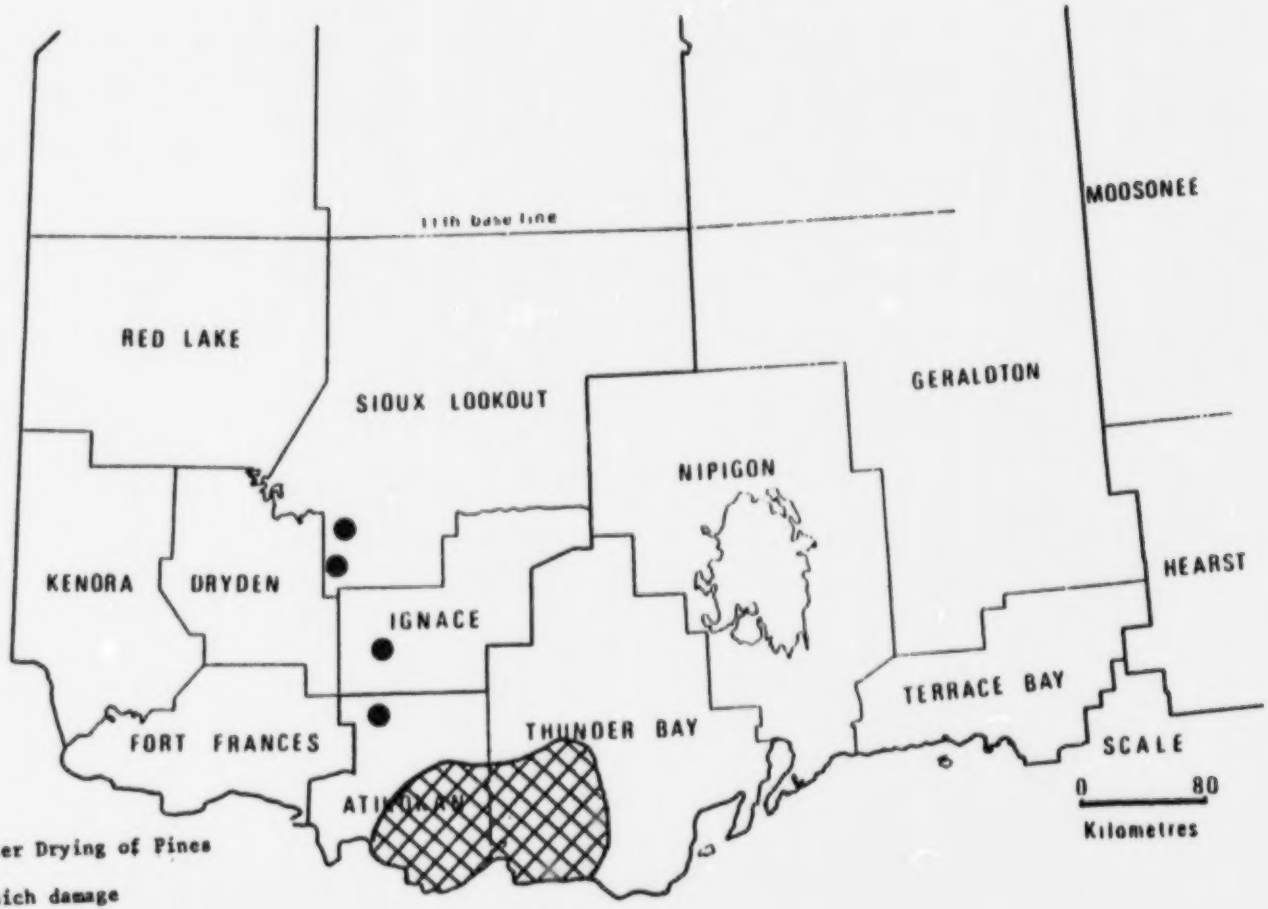
Pine Tortoise Scale

Areas within which mortality occurred in 1957

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



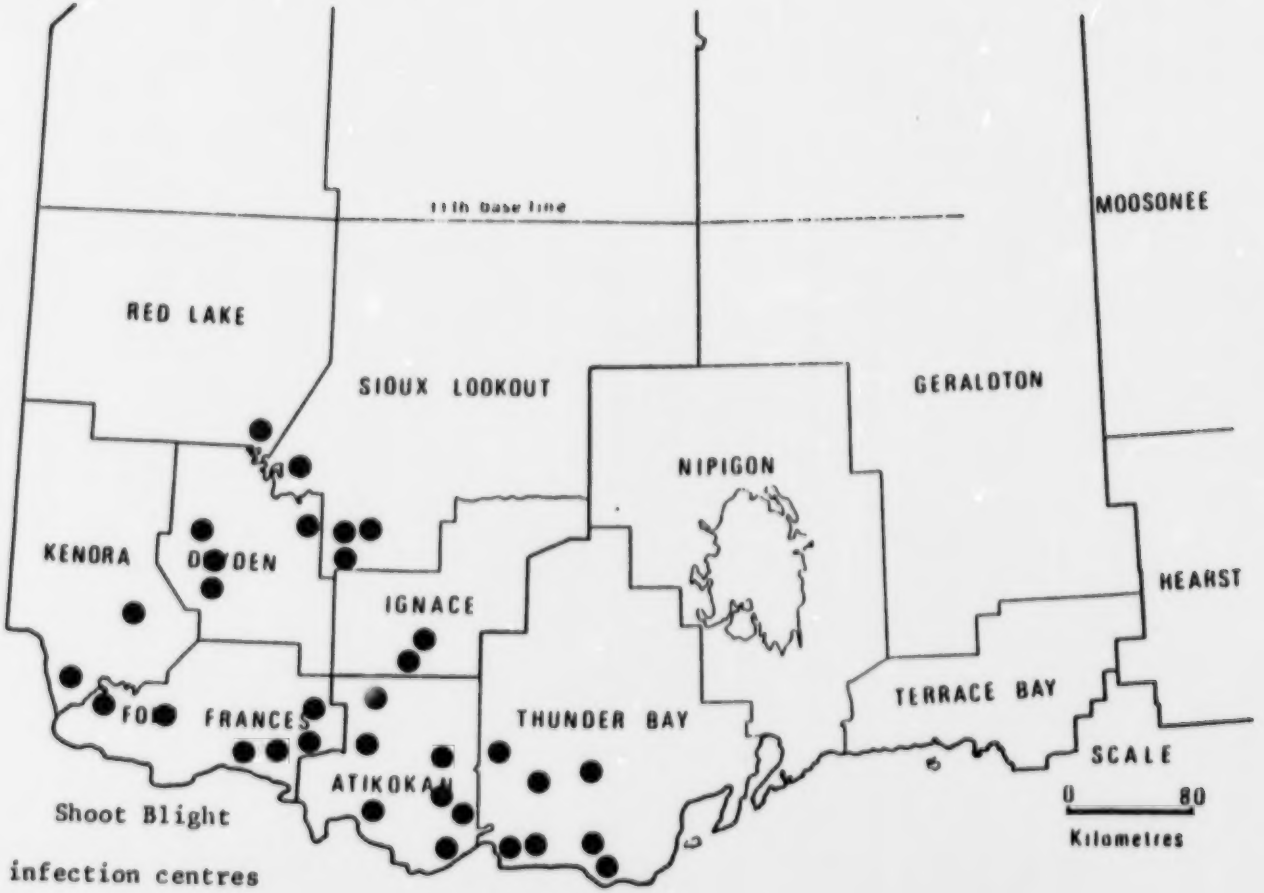
Winter Drying of Pines

Areas within which damage occured in 1973

LEGEND

Moderate-to-severe damage ● or ▨

NORTHWESTERN ONTARIO



Shoot Blight

Locations of infection centres in 1973

LEGEND

Infection centres ●